3M Science. Applied to Life.™

3M Visiting Wizards

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Agenda (everybody's got one)

- Intro
- Background and evolution of 3M Visiting Wizards
- What kits are there?
- Let's DO a kit!
- Deep thoughts
- Other sciency 3M resources

3M Visiting Wizards

Science is Fun!

What is 3M Visiting Wizards?

- 3M scientists (and engineers, and even accountants) providing interesting educational demonstrations and hands-on experiments on a variety of science topics to K-5 classrooms and youth organizations to encourage young people to become *interested* in science and technology.

~~STEM~~ History

Eye chart

Kit Name	Description	Science Topic(s)
Air and Vacuum	Pressure is generally the result of molecules, within gas or liquid, impacting on their surroundings. Experiment with everyday items that use air pressure and vacuum to understand how they work and why they are used. (this kit uses hand pumps for vacuum experiments – a bit more hands on)	Pressure, Bernoulli's principle, Vacuum
Air in Motion	Pressure is generally the result of molecules, within gas or liquid, impacting their surroundings. Experiment with everyday items that use air pressure and vacuum to understand how they work and why they are used. (this kit uses an electric pump for vacuum experiments – less hands on)	Pressure, Bernoulli's principle, Vacuum
Catapults	Catapults are used to take stationary objects (projectile) and hurl them towards a target without an explosive (rocket). Experiment with laws of motion and types of energy to affect the trajectory of an object.	Newton's laws of motion, Potential & Kinetic energy
Color and Light	When we view an object, we are detecting light that originated at a light source, illuminated an object, and has been detected by our eyes. Experiment with light sources and filters to see how we can manipulate the color and light around us.	Reflection, Refraction, Diffusion, Absorption
Crime Lab	The kit includes investigations of how a Crime scene specialist and scientists both use their skills of observation and identification to compare known properties to understand and explain unknown objects and events. Discuss finding solutions based on evidence and a logical and systematic approach.	Observation, evidence, scientific method
Cryogenics	Heat causes molecules to move faster (increase energy) and spread apart, while cold slows them down (decrease energy) and get closer together. Join us as we manipulate states of matter of materials and substances using liquid nitrogen.	States of Matter, Temperature
Data Collection and Analysis	Scientists and engineers collect evidence, or data, to support explanations or theories about how things work. Experiment with different Hot Wheels cars to try and determine the factors that may lead to the "fastest" car available.	Velocity/Acceleration, Forces, Scientific process
Electricity and Simple Circuits	The kit includes demonstrations of simple circuits, generators, parallel and series circuits, switches, including both mechanical and magnetic switches, simple electromagnets, and conductivity testing.	Electricity
Groundwater	The Groundwater kit explains the concept of percolation and filtration, and comprises hands-on demonstrations of how contaminates can enter and move into groundwater.	Water tables, aquifers, pollution and mitigation, filtration

Kit Name	Description	Science Topic(s)
Magic of Science	Three experiments showcase some phenomena that seem like magic, but can be explained by science. Understand that science and magic require careful observation and critical thinking. Learn that the scientific process and creative thinking guide investigations (process) and that science can help us to better understand the world around us (application)	Material science, magnetism
Magnets	Students explore the concepts of attraction and repulsion, magnetic fields, magnetic poles, and electromagnets.	Magnetism, Electromagnetism
Papermaking	Paper is all around us, and has a long history. This kit discusses the history, types, and uses of paper. The main activities of the kit are: 1) making a sheet of paper that the kids get to keep, 2) making a small piece of sandpaper (because 3M!), and 3) observing different types of paper and printing with handheld microscopes.	Paper, Recycling, Manufacturing
Perception	This kit explores the concepts of human perception, how the brain perceives vision, and optical illusions.	Perception, Perspective, Light, Visual Cues
Power of Numbers	This kit discusses collecting data and analyzing data. The first activity focuses on different ways to sort objects and making careful observations. In the second activity, cookies are weighed and then put into a histogram. Statistical concepts such as average can be discussed.	Collection and analysis of data
Science of Sound	This kit's investigations include exploration of the concepts of sound, how sound travels, and how humans experience it.	The nature of sound. How humans perceive sound.
Search for Small	Experiments and activities will demonstrate that: 1. Objects can be observed and measured in different scales of size. 2. Materials can be classified by their properties (size, shape, color, etc.) 3. Materials function in nature and in manufactured goods by employing properties and strategies on a microscopic level	Observations, microscopy
Simple Machines	The investigations include exploration of the concepts of work, force, friction, and gravity and their interplay in the six types of simple machines. Students experiment to see the concepts at work, and discuss where we find them in the world.	Work, force, friction, gravity
Toys in Space	Experiment with some common kids' toys. Make hypotheses about whether they would act the same in zero gravity, then watch video of astronauts playing with the same toys on their missions!	Gravity, inertia.
Wind Energy	Experiment with different configurations of wind turbine blades to see which creates the most energy output.	Wind power, experimental design

Let’s do some . . .

STEAM

ART

My approach

- Fun!
- Lots of interaction, asking questions
- Hands-on as much as possible
- Relate to real world
- Keep it age-appropriate (but I’m sometimes surprised)
- You don’t have to be a scientist to do science
- STEM isn’t for everyone, but don’t assume it’s not for you
  - Keep a sense of wonder
  - Don’t be afraid

3M Science Outreach Programs

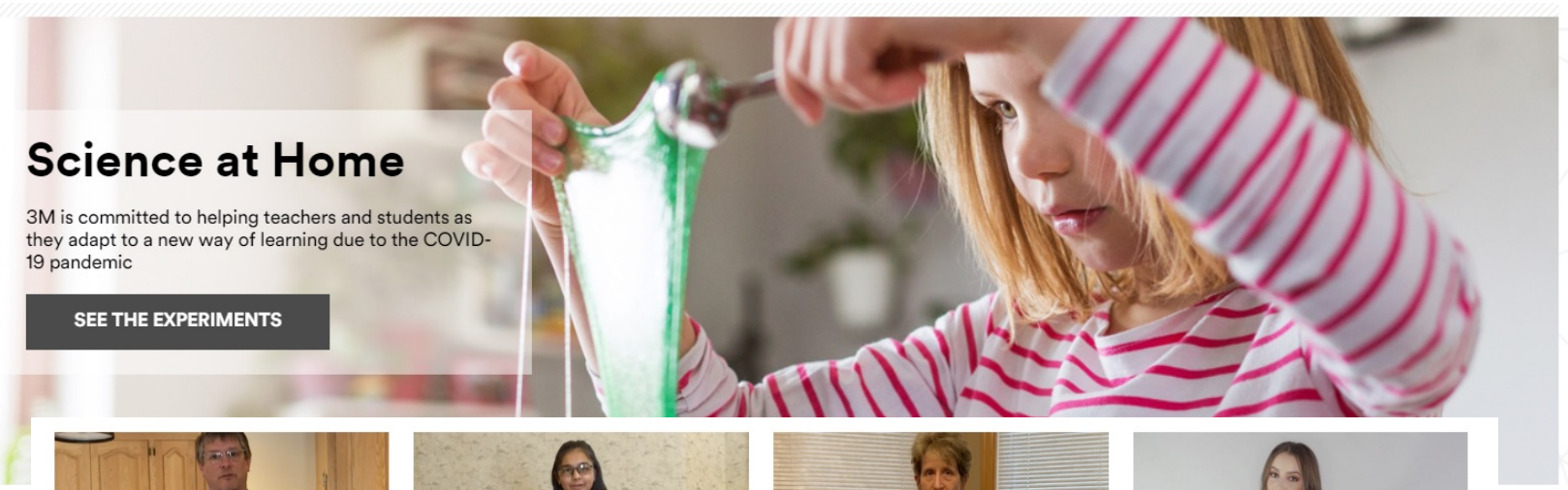
- **STEP:** *3M provides a learning and science-based work experience to junior and senior high school students who show an interest in a scientific career (currently just SPPS). (1972)*

- **TECH:** *3M scientists visiting 6-12 classrooms to encourage elementary, junior and senior high school students, especially young women and minorities, to consider careers in science and engineering. (1979)*

- **TWIST:** *3M provides a summer work experience for math and science high school teachers to work side-by-side with researchers in 3M labs. By providing a challenging, technical experience in an industrial setting, we can reach students through their teachers. (1984)*

- **Visiting Wizards:** *3M scientists providing interesting educational demonstrations and hands-on experiments on a variety of science topics to K-5 classrooms and youth organizations to encourage young people to become interested in science and technology. (1985)*

https://www.3m.com/3M/en_US/science-at-home-us/



Science at Home

3M is committed to helping teachers and students as they adapt to a new way of learning due to the COVID-19 pandemic

SEE THE EXPERIMENTS

Chromatography

Did you know your red marker has more than just red ink inside of it? 3M's SVP for Research & Development and Chief Technology Officer, John Banovetz shows a simple way to separate the materials in your marker using capillary action.

Feeling Sound

Believe it or not, you can feel sound! Join Gitanjali Rao, former Discovery Education 3M Young Scientist Challenge winner, as she teaches about the frequency of sound and how we perceive pitch.

Bernoulli Balance

A jetliner can weigh over 300 tons, so why doesn't it just drop out of the air? 3M's SVP of Corporate Affairs, Denise Rutherford explains the Bernoulli principle and how without it, planes (and birds) couldn't fly.

Diffusion with Miss America 2020

Ever wonder why things mix (or don't mix) differently in different temperatures of water? Join Camille Schrier, a scientist who was crowned Miss America 2020, as she explains diffusion and how substances move though water.

Push & Pull

Follow along with 3M's Sam Reiss, as he shows you that magnetism is more than just a simple push and pull – it's an example of the power of the earth itself.

Liquid Fireworks

Join 3M scientist Jeff Payne as he uses nothing more than milk, dish soap, and a few other kitchen supplies to get the amazing effects of fireworks without using any fire at all.

Inflation Station

Follow along with 3M's Chief Science Advocate, Jayshree Seth, as she teaches students how chemistry can help put some air where it's most needed!

Water Dome

How many water droplets do you think you can fit on a penny? Hint: it is more than you might think! Join 3M scientist Audrey Sherman to find out.

Web resources

- Visiting Wizards:
  - https://www.3m.com/3M/en_US/company-us/visitingwizards/ - register to be able to request free VW visits
  - 3MWizards@mmm.com – general info, help with registering
- Broad overview of 3M Community initiatives, with links:
  - https://www.3m.com/3M/en_US/people-community/our-communities/
- Science at Home – videos of short experiments
  - https://www.3m.com/3M/en_US/science-at-home-us/

3M Science Teacher Workshop

- Friday, October 3rd
- 3:00-5:30pm
- 3M Center, Maplewood (tall building on I-94

- Showcase of 3M and other community STEM resources

- Lots of free 3M stuff!!!