

Science vs. Halloween Magic

Educator Guide

Science vs. Halloween Magic is an exciting hour of exploration and wonder with presenters Rick Crosslin and Keith Ramsey. This engaging, interactive program pits Crosslin's fascinating scientific demonstrations against Ramsey's whimsical pretend magic, complete with wands and spell books. Promising to ignite curiosity and spark imagination, it's the perfect Halloween treat for the entire family.

Activity Demonstration List

1. **Tennis Ball Cannon:** Chemical change & decomposition, exothermic reaction, energy
2. **Knock Your Socks Off:** Chemical change & decomposition, exothermic reaction, energy
3. **Spin Water:** Angular momentum, energy, gravity
4. **Whoosh Skull Cannon:** Chemical change & decomposition, exothermic reaction, energy, electricity
5. **Whoosh Bottles:** Chemical decomposition, exothermic reaction, light & sound energy
6. **Genie in a Bottle:** Chemical change & decomposition, exothermic reaction
7. **Electric Dynamo & Edison Light Bulb:** Electromagnetic energy, magnets, light energy
8. **Electric Pickle:** Light & sound energy, electricity
9. **Oudin Coil – Magic Wand Gas:** Wireless transfer of electricity & photon emission
10. **Ooh Aah Spray Flame Test:** Light energy, photon emission of metal salts
11. **Fire Tornadoes:** Centripetal force, light properties and angular momentum
12. **Hydrogen Balloons – He, O₂, H, H&O₂:** Rapid thermal decomposition, potential & kinetic energy
13. **Fire Hands – Skull Basin:** Chemical energy, light energy, convection currents
14. **Disappearing Flame:** Nitrocellulose thermal decomposition
15. **Bernoulli Bag:** Air pressure, air volume, gas laws
16. **Bernoulli Ball vs Newton Ball:** Air pressure, air volume, gas laws
17. **Bernoulli Mummy:** Air pressure, air volume, gas laws
18. **Elephant Toothpaste in a Pumpkin:** Chemical exothermic change & decomposition
19. **LN₂ Fun:** States of matter, cryogenics
20. **Smoke Vortex:** Air pressure, gas laws
21. **LN₂ Explosion & Volcanoes:** States of matter, cryogenics

Presenter Biographies

Rick Crosslin

Rick Crosslin recently retired after 48 years as a public educator, recently serving as the Scientist in Residence for 12 elementary schools in MSD Wayne Township, Indianapolis. A passionate advocate for hands-on learning, he has taught at the Children's Museum of Indianapolis, Indiana Department of Correction Boys' School, and in classrooms from Indiana to Cairo, Egypt.

His numerous accolades include the 2004 Indiana University School of Education Distinguished Alumni Award, the 1998 Milken National, Christa McAuliffe Award, and NASA Teacher in Space Indiana Runner Up. For over 50 years, he has created and led Science Summer Safari, inspiring young minds through immersive STEM experiences. He has created national projects for NASA, FAA KBYF Drone, Academy of Aeronautics, and National Geographic Prehistoric Sea Monsters.

Crosslin was also the host and executive director of the Emmy-winning PBS series *Indiana Expeditions*, where he championed his motto: *Science is for Everyone!* He continues to engage students through his YouTube and Facebook platform, [RickCrosslinScience](#), which features over 500 video lessons for students and teachers, and he brings his *Science Spectacular* show to schools across the Midwest.

Crosslin has been an educator in nearly every setting imaginable – teaching everyone from preschoolers to adults in public and private schools, online classrooms, and even state prisons. Beyond teaching, he is a writer, speaker, and science demonstrator.

Keith Ramsey

Keith Ramsey is a master chemist who enjoys designing chemistry and physics demonstrations that employ specific learning targets for multiple grade levels.

After completing a master's degree from California State University, Los Angeles, Keith taught for over 25 years in both Pasadena, California, and Indianapolis, Indiana. Currently, he's teaching high school chemistry and physics at The Excel Center of Indianapolis.

Keith has presented in front of large audiences for Wayne Township's annual science show, "Science Claus," as well as, "Science vs. Halloween Magic" at both Conner Prairie and Hendricks Live theater. Keith is also the Associate Pastor of Garden Baptist Church of Indianapolis. In addition, Keith hosts weekly science demonstrations on his YouTube channel, RamZland.

Keith has received the IPL Golden Apple Award of Indianapolis, Teacher of the Year Award, Ben Davis Seniors' Choice Award for 12 consecutive years, and Ben Davis Top 30 Seniors' Choice Award for four consecutive years. Keith's other interests include writing, and he has published a children's book titled *Fly Fishing with Dad* (2006). Most of all, Keith cherishes his family, his beautiful wife Mary, who teaches French for Wayne Township, and his two brilliant sons, Aiden and Alex.

Science vs. Halloween Magic

Indiana Academic Standards for Science (Grades 1–6)

Grade 1 Standards

- **Properties of Matter / Changes in Matter:** Observing states of matter and changes when materials are heated/cooled
 - *LN₂ Fun, LN₂ Explosion & Volcanoes* – demonstrate material state changes (liquid → gas)
 - *Elephant Toothpaste in a Pumpkin, Chemical change & decomposition, Genie in a Bottle* – show exothermic chemical changes
 - **Motion / Energy:** Objects moving by forces, causes of motion
 - *Spin Water* (angular momentum)
 - *Fire Tornadoes* (rotational motion)
 - *Bernoulli Bag, Bernoulli Ball vs Newton Ball, Smoke Vortex* – illustrate air movement laws
 - **Light & Sound:** Visible only when illuminated; vibrating materials make sound
 - *Knock Your Socks Off, Whoosh Bottles, Fire Hands, Ooh Aah Spray Flame Test* (light & sound energy)
 - *Oudin Coil – Magic Wand Gas, Electric Dynamo & Edison Light Bulb, Electric Pickle* – electricity and illumination
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Grade 2 Standards

- **Properties of Matter & Changes:** Solids, liquids, gases, and transformations involving heat
 - *LN₂ Fun / Explosion, Elephant Toothpaste, Genie in a Bottle*
 - *Chemical change & decomposition, Fire Tornadoes, etc.*

- **Motion / Forces:** Objects in motion; gravity
 - *Spin Water, Fire Tornadoes* (centripetal/rotational)
 - *Bernoulli demos, Whoosh Skull Cannon* using gas forces
 - **Energy:** Use of different energy forms
 - *Electric Dynamo, Electric Pickle, Oudin Coil*, etc.
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Grade 3 Standards

- **Energy & Physical Science:** Identification of light, sound, magnetism; straight-line light travel causing shadows
 - *Light & sound energy* demos (Knock Your Socks Off, Fire Hands, Ooh Aah Spray, Electric Dynamo)
 - *Magnetism* via electromagnetic demos (Edison bulb, Oudin Coil)
 - **Changes in Matter:** Observing irreversible changes and state transitions
 - *Chemical decomposition/change, LN₂ Volcano, Elephant Toothpaste*
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Grade 4 Standards

- **Properties of Matter / Changes:** Chemical changes producing new materials; heating and phase changes
 - *Chemical reactions, Exothermic reactions, Elephant Toothpaste, LN₂ demos*
 - **Motion / Energy:** Forces causing changes in speed; heat energy
 - *Fire Tornadoes, Spin Water, Bernoulli demos*
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Grade 5 Standards

- **Energy Transfer:** Heat transfer through contact or radiation
 - *LN₂ melting, Fire demos, Elephant Toothpaste, Genie in a Bottle*
 - **Properties of Matter / Chemical Changes:** Formation of new materials
 - *Chemical decomposition, Elephant Toothpaste, Whoosh Bottles, Genie in a Bottle*
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Grade 6 Standards

- **Energy Transfer:** Including mechanical, thermal, electrical
 - *Electromagnetic energy* in Electric Dynamo, Oudin Coil, Electric Pickle
 - *Exothermic chemical energy* in decomposition and fireworks-style effects
 - **Properties of Matter:** Atoms/elements and compounds (introductory)
 - *Chemical reactions* such as decomposition and Elephant Toothpaste illustrate formation of new substances
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Summary Table

Demonstration Type	Grades & Matching Standards
Chemical changes & exothermic reactions	Grades 1–6 (Matter & Energy, Chemical Changes)
Phase changes (LN ₂ demos)	Grades 1, 2, 5 (States of Matter, Energy Transfer)
Forces / Motion / Air pressure	Grades 1–4 (Motion, Forces, Gravity, Air Pressure)
Light, Sound, Electricity, Magnetism	Grades 1–3 (Light, Sound), 3–6 (Electricity, Magnetism, Energy)
Visual Spectacles (& photon emission)	Grades 1–3 (Light), Grade 6 (Introduction to photons/atoms)

Science vs. Halloween Magic

Structured IDOE Standards Alignment

Grade 1 Standards

1.PS.3 – *Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.*

- **Demo:** *Electric Pickle* (sound & electricity)
 - **Student Objective:** I can investigate how electricity can make things vibrate and produce sound.
 - **Educator Guide:** Use the electric pickle to demonstrate electricity producing vibration and sound. Ask students: *“What do you hear, and why do you think it’s happening?”*

1.PS.4 – *Make observations to collect evidence and explain that objects can be seen only when illuminated.*

- **Demos:** *Knock Your Socks Off, Fire Tornadoes, Ooh Aah Spray Flame Test* (all include visible light effects)
 - **Student Objective:** I can observe and explain that light allows us to see objects.
 - **Educator Guide:** Engage students in noticing how light highlights objects; ask: *“What would you see if the light went off?”*
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Grade 3 Standards

3.PS.3 – *Generate sound energy using a variety of materials and techniques, and recognize that it passes through solids, liquids, and gases.*

- **Demos:** *Electric Pickle, Knock Your Socks Off, Whoosh Bottles*
 - **Student Objective:** I can create sound and explain how it travels through different materials.
 - **Educator Guide:** Explore how sound travels through air, water (all demos produce audible effects) and discuss.

3.PS.4 – *Investigate and recognize properties of sound (pitch, loudness, vibration).*

- **Demos:** *Electric Pickle, Fire Hands* (sound from chemical & electrical reactions)
 - **Student Objective:** I can describe sound properties like pitch and loudness and how they relate to vibration.
 - **Educator Guide:** Compare softer vs louder sounds, discuss vibration's effect on pitch.

3.PS.6 – Describe evidence to support the idea that light and sound are forms of energy.

- **Demos:** *Knock Your Socks Off, Ooh Aah Spray, Fire Tornadoes*
 - **Student Objective:** I can recognize that light and sound come from energy and describe how.
 - **Educator Guide:** Help students link dramatic light and sound to energy release in reactions.
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Grade 4 Standards

4.1.5 – Demonstrate that electrical energy can be transformed into heat, light, and sound.

- **Demos:** *Electric Dynamo & Edison Light Bulb, Electric Pickle, Oudin Coil – Magic Wand Gas*
 - **Student Objective:** I can show how electricity changes into other energy forms (light, sound, heat).
 - **Educator Guide:** Have students observe and chart which energy forms they see or hear. Prompt: “What type of energy is being created here?”

4.4.3 – Investigate how changes in speed or direction are caused by forces.

- **Demos:** *Spin Water, Fire Tornadoes* (centripetal force), *Bernoulli Bag, Bernoulli Ball vs Newton Ball*
 - **Student Objective:** I can explain how forces change motion – speed or direction.
 - **Educator Guide:** Use visuals to show direction changes; prompt: “Why does the ball stay up? What force is acting here?”

Grade 5 Standards

5.1.4 – *Determine if matter has been added or lost by comparing weights when melting, freezing, or dissolving a sample of a substance.*

- **Demos:** *LN₂ Fun, Lion Toothpaste in a Pumpkin*
 - **Student Objective:** I can measure matter before and after a reaction to see if mass changes.
 - **Educator Guide:** Discuss observable vs non-visible matter (gas release). Ask: *“Why might mass change even if we don’t see something getting lighter?”*
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Grade 6 Standards

Though not all sixth-grade standards are publicly available, the overarching themes include **energy transfer**, **matter transformations**, and **understanding atomic-level interactions**. Many demos—like exothermic reactions, photonic emissions, and decompositions—tie into these core ideas.

Summary Table

Demonstration	Grade-Level Standard Code	Student Objective
Electric Pickle	1.PS.3	I can investigate how electricity makes things vibrate and sound.
Knock Your Socks Off, etc.	1.PS.4	I can explain that light lets us see objects.
Sound & light demos	3.PS.3 / 3.PS.4 / 3.PS.6	I can describe how sound/light are energy, their pitch/loudness.
Electrical demos	4.1.5	I can show electricity transforming into light, heat, sound.
Motion / force demos	4.4.3	I can explain how forces change motion.
LN ₂ & chemical reaction demos	5.1.4	I can measure if mass is added or lost during a reaction.

Educator Notes & Best Practices

- **Pre-Show Prep:** Introduce vocabulary – energy, force, light, sound, matter, decomposition.
- **During Show:** Encourage student observation: *“What changes? What do you think is causing that?”*
- **Post-Show Reflection:** Have students sketch or write a summary: What did they see? Which scientific principle applied?

Here’s a fully mapped alignment of **all your “Halloween Live! Magic vs Science” demonstrations** to **Indiana Academic Standards for Science (Grades 1–6)**, focusing especially on grades 3–5 where specific codes are publicly available. Each demo is paired with a relevant standard, a **student-facing objective**, and an **educator guide note** to help with instructional integration.

Grade 3 (where applicable)

Though detailed IN standard codes for Grade 3 aren't easily accessible here, the 2023 Indiana standards emphasize three-dimensional learning with practices, crosscutting concepts, and core ideas [Gove](#). Hence, the demos can link to the **NGSS-aligned performance expectations**:

- **Sound & Light as Energy** (*Knock Your Socks Off, Whoosh Bottles, Fire Hands, Ooh Aah Spray, Electric Pickle*)
 - **PE:** "Light and sound are forms of energy that can be produced by things that give off light or make sound."
 - **Objective:** I can explain that sound and light are forms of energy produced by reactions or electricity.
 - **Guide:** Encourage students to describe how each display demonstrates energy transformation.
- **Forces / Motion** (*Spin Water, Fire Tornadoes, Bernoulli Bag, Bernoulli Ball vs Newton Ball, Smoke Vortex*)
 - **PE:** "Forces like air pressure and centripetal force can cause objects to move in specific ways."
 - **Objective:** I can describe how forces like air or spinning motion change how things move.
 - **Guide:** Have students compare how air pressure or rotation keeps objects moving in unique paths.

Grade 4 (adopting NGSS-based approach)

- **Electricity to Light/Heat/Sound** (*Electric Dynamo & Edison Light Bulb, Electric Pickle, Oudin Coil – Magic Wand Gas*)
 - **PE:** "Electrical energy can be converted into heat, light, or sound."
 - **Objective:** I can identify how electricity is changed into light, heat, or sound energy.
 - **Guide:** Chart each demo—ask, "What kind of energy do you see or hear?"

- **Force-Driven Motion** (*Spin Water, Fire Tornadoes, Bernoulli Bag, Bernoulli Ball vs Newton Ball*)
 - **PE:** “Forces cause objects to start, stop, slow down, or change direction.”
 - **Objective:** I can explain how forces change motion in objects.
 - **Guide:** Highlight examples of motion changes and ask students to identify the force at play.
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Grade 5 (Indiana-aligned standards via IXL – PS Physical Science)

5-PS1: Matter and Its Interactions

- **5-PS1-1** (*LN₂ Fun, LN₂ Explosion & Volcanoes, Elephant Toothpaste in a Pumpkin*)
 - **Objective:** I can use a model to explain that matter is made of tiny particles too small to see.
 - **Guide:** Discuss how these demos show particles changing state or reacting invisibly and visibly.
- **5-PS1-2** (*Chemical change & decomposition demos, Genie in a Bottle, Elephant Toothpaste, Whoosh Bottles*)
 - **Objective:** I can graph data to show that matter is conserved during heating, cooling, or mixing.
 - **Guide:** Facilitate an experiment showing before-and-after mass or volume changes, even when gas escapes.
- **5-PS1-4** (*Genie in a Bottle, Exothermic reactions*)
 - **Objective:** I can conduct a test to see whether combining things makes new materials.
 - **Guide:** Ask students to predict and observe whether new substances form after a reaction.

5-PS3: Energy

- **5-PS3-1** (select demos linking energy sources to heat or motion—e.g., *Fire Hands*, *Electric Dynamo*, *TN₂ reactions*)
 - **Objective:** I can explain that energy in food (or reactions) was once from the sun.
 - **Guide:** Tie energy release in demos to energy sources in nature (like sunlight) to make connections.
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Grade 6 (Modeled using NGSS/IDOE themes)

Indiana's 2023 standards for Grade 6 emphasize energy transfer, matter transformations, and atomic-level interactions within three-dimensional learning.

- **Energy Transformations & Electrical Phenomena** (*Electric Dynamo*, *Electric Pickle*, *Oudin Coil*, *Ooh Aah Spray*)
 - **PE:** "Energy is transferred and transformed in physical and chemical processes."
 - **Objective:** I can explain how electricity can produce light, heat, sound, or photon emissions.
 - **Guide:** Discuss how energy changes forms in each demonstration.
- **Chemical Reactions & Atom-Level Changes** (*Chemical decomposition*, *Elephant Toothpaste*, *Disappearing Flame*, *Hydrogen Balloons*, *Nitrocellulose Decomposition*)
 - **PE:** "Chemical reactions involve rearranging atoms to create new substances."
 - **Objective:** I can identify evidence of new substances forming (gas, heat, light, color change).
 - **Guide:** Prompt students to note reaction signs and connect them to atomic changes.
- **States of Matter & Thermal Dynamics** (*LN₂ Fun*, *Smoke Vortex*, *LN₂ Explosion & Volcanoes*)
 - **PE:** "Matter can change state when energy is added or removed."
 - **Objective:** I can describe how temperature changes cause matter to change states (solid/liquid/gas).

- **Guide:** Encourage observation of phase changes and linking temperature to state transitions.

Summary Table

Demonstration	Grade	Standard Code / PE	Student Objective
Electric Dynamo, Pickle, Oudin Coil, Ooh Aah	4–6	Electricity → light/sound/ heat; Energy transformations	Identify how electricity changes into other energy forms
Spin Water, Fire Tornadoes, Bernoulli demos	3–4	Forces change motion	Explain forces affecting motion
LN ₂ demos, Elephant Toothpaste, Chemical Reactions	5–6	Matter conservation, reactions, phase changes	Identify new substances or state changes in demonstrations
Light & Sound demos (Knock Your Socks Off, etc.)	3–4	Light and sound are energy	Explain energy in reactions producing light/sound
Hydrogen Balloons, Nitrocellulose, etc.	5–6	Chemical reactions, decomposition, energy release	Discuss evidence of atomic-level transformations

Educator Tips for All Grades

- **Begin with curiosity questions:** e.g., “What do you think will happen? Why?”

- **Use notebooks:** Students capture predictions, observations, and reflections.
- **Highlight crosscutting concepts:** Emphasize cause-effect, energy interactions, and model-building.
- **Post-show extensions:** Facilitate experiments exploring similar principles (air pressure, reactions, electricity).