Museum of Science.

The Amazing Nano Brothers Juggling Show

K – 8 Educator Guide

Educator Guide

This educator guide provides background information, resources, and activities for teachers whose students will see a performance of *The Amazing Nano Brothers Juggling Show*.

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*Two electronic files accompany this guide with supplementary resources:

- **ANB_PowerPoint.pptx** – contains a customizable set of slides (with a script) to introduce students to the show.
- **ANB_ActivityGuide.pdf** – contains the full color activity guides, printable materials, and resources for the activities listed in this Educator Guide.

To inquire about performance bookings or for help using this guide, contact nano@mos.org.

An Overview of *The Amazing Nano Brothers Juggling Show*

Introduction

The Amazing Nano Brothers Juggling Show is a 40-minute live dramatic performance exploring nanoscale science and technology. Using an engaging blend of juggling, drama, and comedy, the show introduces students to the mysteries of matter—including atoms, molecules, nanoscale forces, and scanning probe microscopy. The show features two brothers—Dan, a know-it-all, and Joel, a naïf—who must deliver a juggling show about the atomic world when it is discovered that the scheduled performers—the Nano Brothers—are too small to see. The performance delivers extraordinary physics visualizations created through juggling, lighting, and large-scale gymnastic metaphor, while engaging students through dynamic character acting, jokes, stunts, and audience participation. Who knew physics could be so much fun?

Program

Prologue – Come See The Amazing Nano Brothers!

Act 1 – Introducing the Nano World

- Scene One – Too Small to See
- Scene Two – Everything Is Made of Atoms
- Scene Three – The Mysterious Atom

Act 2 – Things are Different Down There

- Scene One – Warmer, Faster
- Scene Two – Bonding: Sharing Electrons
- Scene Three – Unexpected Properties
- Scene Four – Molecules and Me
- Scene Five – Really Reactive

Act 3 – Feeling Atoms

- Scene One – The Scanning Probe Microscope
- Scene Two – Writing with Atoms
- Scene Three – You Can't Shrink People Down to the Nanoscale

Finale – The Nano-Product Juggle (Don't Try This at Home!)

Educational and Entertaining

As of 2018, *The Amazing Nano Brothers Juggling Show* has traveled to more than 90 schools across the northeast to engage over 24,000 elementary and middle school students. In 2010, an independent outcomes evaluation by the Goodman Research Group[1] looked at the show's effectiveness at increasing learning and interest in nanoscale science, engineering, and technology. Results showed significant increases in learning for students, and found the show to be captivating for students and teachers alike. The medium of juggling was highly successful for teaching students about the structure, movement, and manipulation of atoms. Teachers reported their students were engaged, and they found the show correlated well with science standards and reinforced lessons from the classroom. For information about booking the show for your school, please contact nano@mos.org.

Preview the show in advance

You can watch a video of the performance here: https://youtu.be/4WBRsVIiVBs although it does not capture the full impact of the immersive performance experience.

Credits

Starring Dan Foley and Joel Harris; written and directed by Carol Lynn Alpert in collaboration with the performers.

Developed and supported by the National Science Foundation through sub-awards from the Center for Integrated Quantum Materials and the Nanoscale Science and Engineering Center, both headquartered at Harvard University, and the Center for High-rate Nanomanufacturing headquartered at Northeastern University (Award Nos. 1231319, 0646094, 0832785).

1 Goodman Research Group. 2010. *The Amazing Nano Brothers Juggling Show* Outcomes Evaluation. Cambridge, MA. http://www.grginc.com/documents/GRGMOSReportFINAL10-15.pdf

Learning Opportunities & Education Standards

The Amazing Nano Brothers Juggling Show provides a wide range of learning opportunities. See pg. 6 for Next Generation Science Standards connections by grade level.

Science, Technology, Engineering, and Math (STEM) Content

- **Introduction to atoms and molecules**
    - Everything is made of tiny particles called *atoms.* There are only about 120 different kinds of atoms, all listed on the Periodic Table.
    - Each atom contains a super tiny nucleus (protons and neutrons), surrounded by a larger “cloud” of electrons.
    - Atoms are always moving: cold atoms move slowly; warm atoms move fast.
    - Atoms can be attracted to each other, and two or more atoms can bond to form a *molecule* by sharing some of their electrons.

- **Exploring Size and Scale**
    - Molecules are *nanoscale* objects – so small they are measured in *nanometers*. A single nanometer is just one-billionth of one meter!
    - Nanoscale objects are subject to different kinds of forces than larger objects, and so they behave differently.
    - Nanoscale objects are too small to see, even with most microscopes.
    - In the 1980s, a team of IBM scientists led by Don Eigler invented a special kind of microscope (a Scanning Probe Microscope) that could image and *move* individual atoms.

- **Introduction to Nanotechnology**
    - Nano scientists and engineers design new materials and devices that, because of their size, structure, and behavior, can do things other materials and devices cannot.
    - Nanotechnology is new, but is already in many products we use.
    - Nanotechnology may have economic, health, and environmental impacts that we have yet to discover.

- **Making Models**
    - Making models can help us better understand scientific concepts.
    - Models are inexact, but can help us visualize certain aspects of matter and forces.

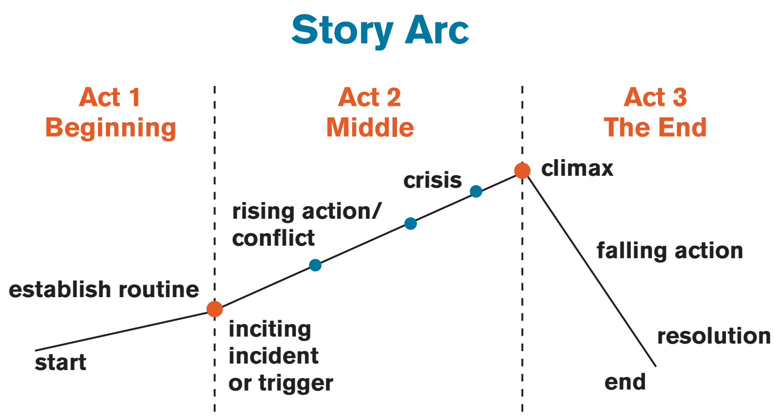
Next Generation Science Standards

Grade Level	Standard	Description
K – 2	K-PS2-1	**Motion and Stability: Forces and Interactions** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
	1-PS4-4	**Waves and Their Applications in Technologies for Information Transfer** Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
	2-PS1-3	**Matter and Its Interactions** Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
3 – 5	3-PS2-1	**Motion and Stability: Forces and Interactions** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
	4-PS3-1	**Energy** Use evidence to construct an explanation relating the speed of an object to the energy of that object.
	5-PS1-1	**Matter and its Interactions** Develop a model to describe that matter is made of particles too small to be seen.
	5-PS2-1	**Motion and Stability: Forces and Interactions** Support an argument that the gravitational force exerted by Earth on objects is directed down.
6 – 8	MS-PS1-1 MS-PS1-4	**Matter and its Interactions** Develop models to describe the atomic composition of simple molecules and extended structures. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
	MS-PS2-4	**Motion and Stability: Forces and Interactions** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

In addition to the above Disciplinary Core Ideas, *The Amazing Nano Brothers Juggling Show* supports a number of NGSS Practices and Crosscutting Concepts:

Science & Engineering Practices	Crosscutting Concepts
Developing and using models	Cause and effect
Constructing explanations and designing solutions	Scale, proportion, quantity
Obtaining, evaluating and communication information	Systems and system models
Using Mathematics and computational thinking	Energy and matter

Connections to Language Arts, Literacy, and Theatre



Besides being an effective tool for science and engineering education enrichment, *The Amazing Nano Brothers Juggling Show* can be introduced to students as a model for literary and dramatic arts inquiry. The play was written and constructed in the form of a classic three-act drama, beginning with an "inciting incident" (Dan informs Joel that the audience will *not* be able to see the Amazing Nano Brothers perform, as Joel had promised). In subsequent scenes, as Dan and Joel improvise to keep the audience entertained, obstacles to the Nano Brothers *ever* being able to mount a suitable show seem to pile up, until at last, Dan and Joel realize they have succeeded and celebrate with a Grand Finale. As in all literature, there is conflict: the two dramatic personae, Joel and Dan, initially hold contrasting perspectives, embodying opposing values and approaches. Their scene-by-scene interactions navigate a range of human emotions and can be regarded as metaphors for many relationships in life: student and teacher, child and parent, naïf and know-it-all, younger and older sibling, enthusiast and realist. Both characters make direct appeals to the audience to use reason and common sense to take sides, and yet, by the end, like true heroes, they succeed in bringing about a resolution to their conflict that validates a union of both approaches and delivers just rewards to the audience. The story arc is complete. Students may use the show Program (pg. 3) which lists the acts and scenes of the show to map out the heroes' journeys, and teachers can make connections to other curriculum areas via writing, discussion, and short skits.

- **Skills from Language Arts/Literacy Standards**
  - Integrating and evaluating content presented in diverse media and formats
  - Acquiring and using academic and domain-specific vocabulary
  - Describing themes, characters, settings, and events from a drama
  - Comparing and contrasting different points of view

- **Skills from Theatre Standards**
  - Responding to and reflecting on theatrical experiences
  - Identifying and explaining preferences and emotions in a theatrical experience
  - Considering characters, and their qualities, motivations, and choices
  - Making connections to personal experiences
  - Incorporating other content areas in drama/theatre work

Glossary of Vocabulary Terms

Suggested Vocabulary Terms by Grade Level:

K – 2: Nano, Atom, Attract, Magnify, Force, Model, Microscope

3 – 5: Nano, Nanometer, Atom, Molecule, Bond, Force, Model, Reactive, Scanning Probe Microscope, Nanotechnology

6 – 8: Nano, Nanometer, Atom, Nucleus, Electron, Molecule, Bond, Force, Reactive, Model, Scanning Probe Microscope, Periodic Table of Elements, Nanotechnology

Atom
Atoms are tiny particles made up of a nucleus containing protons and neutrons, and electrons. Atoms are the building blocks of all living and non-living ***matter.***

Attract
To pull something closer. Objects that are attracted to each other will move closer to each other. When ***atoms*** are attracted to each other they can ***bond*** together to form ***molecules***, by sharing ***electrons***.

Bond
To attach two or more ***atoms*** together, by sharing electrons. ***Atoms*** can ***bond*** to each other to form ***molecules***.

Electron
Electrons are tiny particles that exist in a range of energy levels around the ***nucleus*** of an ***atom.*** Electrons can be transferred or shared between atoms, causing the atoms to ***bond*** together. Electrons can also flow from atom to atom producing electrical current.

Force
A push or pull from one object that changes the motion of another object. You use force to throw a ball to your friend. ***Atoms*** have forces that can ***attract*** other atoms or push them away.

Magnify
To make something look bigger. Some objects are too small to see with just our eyes. We can use tools, like magnifying glasses or ***microscopes***, to make objects look bigger. ***Atoms*** are too small to see with regular microscopes, so we use special microscopes, called ***Scanning Probe Microscopes***, to see atoms.

Matter
Anything that takes up space is matter. This includes things that are alive, like plants and animals, and things that are not alive, like rocks and water. ***Atoms*** are the building blocks of all matter.

Microscope
A tool used to ***magnify*** an object so you can see more details. Objects like ***atoms*** are much too small to see with our eyes, so we use special microscopes, called ***Scanning Probe Microscopes***, to see atoms.

Model

A simplified copy of an object that can be smaller or larger than the real object. A toy airplane is a model of a real airplane–it looks like a real airplane, but it is much smaller, may be made of different materials, may work differently, and you can hold it in your hand. Just like we can make small models of big objects, we can also make big models of very small objects. ***Atoms*** are too small to see, but we can build models of atoms that are big enough to see.

Molecule

Two or more ***atoms*** bonded together. A sodium atom and a chloride atom bond together to make a single salt molecule. The salt that you put on your food is made up of trillions and trillions of tiny salt molecules. DNA is an example of a larger molecule containing many atoms.

Nano

Nano means very, very small. A ***nanometer*** is a unit of measurement. There are one billion nanometers in a meter. A five-year-old child is about one meter tall, or one billion nanometers tall. Tiny objects measured in nanometers are considered ***nanoscale*** objects.

Nanotechnology

The manipulation of ***nanoscale matter***, like ***atoms*** and ***molecules***. Scientists and engineers are creating new types of materials, devices, and even medicine using nanotechnology. A computer chip is an example of a device made using nanotechnology.

Nucleus

The center of an ***atom***. The nucleus is made up of tiny particles called protons and neutrons.

Periodic Table of Elements

A chart that lists all the different types of ***atoms*** (about 120). The Periodic Table also has information about the properties, or characteristics, of each kind of atom.

Reactive

To act in response to something. When you bump into someone, you might react by saying "excuse me." ***Nanoscale*** objects are more reactive than larger objects. For example, soda cans made of aluminum metal don't explode, but nanosized particles of aluminum can explode!

Scanning Probe Microscope

A special type of ***microscope*** that uses the ***forces*** of ***atoms*** to make a large picture of the atoms. A Scanning Probe microscope has a probe, or tip, that moves, or scans, over the atoms. As the probe moves, it feels the forces from the atoms. Then, it sends the information to a computer. The computer is programmed to use the information from the probe to draw a picture of the atoms. Imagine that you have an object that you cannot see and you need to figure out what that object looks like just by feeling it with your hands. This is similar to how a Scanning Probe Microscope "feels" atoms.

Classroom Activities & Extensions

Introductory PowerPoint Presentation

Before your students see *The Amazing Nano Brothers Juggling Show*, you can review the accompanying introductory PowerPoint presentation in class to help orient them. (ANB_PowerPoint.ppt)

The presentation includes a customizable set of slides and a script to introduce your students to the main characters, Dan and Joel, and to the premise of the show. It also introduces a few key concepts:

- "Nano" is very, very small
- Examples of nanoscale objects
- We need special tools to see very small things
- Nanoscale objects can have unusual behaviors
- Nanotechnology involves making materials and devices with nanoscale features

Please feel free to adapt the slides and script to best meet the needs of your students. Stopping after Slide 25 is one way to shorten the presentation or make it more appropriate for younger students.

The detailed script is in the "Notes" section of the PPT slides, also printed here.

[Slide 1] We are going to see a performance of *The Amazing Nano Brothers Juggling Show* from the Museum of Science in Boston.

[Slide 2] The Amazing Nano Brothers are Dan…

[Slide 3] And Joel.

[Slide 4] Dan and Joel are going to use juggling to teach us about the nano world.

[Slide 5] Joel starts out the show by announcing the upcoming appearance of tiny jugglers, called the "Amazing Nano Brothers" who are going to perform on a very small stage.

[Slide 6] Dan steps in to help Joel understand why you can't see the tiny jugglers.

[Slide 7] To help Joel understand all of this, Dan begins teaching him about the amazing nano world using juggling tricks and even giant unicycles!

[Slide 8] The Amazing Nano Brothers will teach us all about Nano. Can anyone guess what "nano" means?

[Slide 9] Nano means small – very, very small. Can anyone think of something small? How about something smaller? Even smaller? *[Teacher Note–Have students tell, write, or draw the smallest thing they can think of.]*

[Slide 10] Things that are nanoscale are even smaller than a mouse…

[Slide 11] smaller than an ant…

[Slide 12] And even smaller than a teeny, tiny grain of sand…

[Slide 13] Nano-sized things are so small you can't even see them!

[Slide 14] Things that are nano are measured in nanometers. A nanometer is very small. Can you hold up your hands so they are a meter apart? When I hold out my arm, the distance from my nose to the tips of my fingers is about a meter. A five-year-old child is about one meter tall or one billion nanometers tall.

[Slide 15] What types of things are nano?

[Slide 16] Germs, like viruses–the tiny things that can make you sick–these are very small, they are only about 100 nanometers–they are nano-sized!

[Slide 17] DNA, the information inside the cells of our body, is only about two nanometers wide! Do you think anything can be smaller than nano?

[Slide 18] Has anyone ever heard of an atom? Everything on Earth is made of tiny building blocks called *atoms*. Atoms are tiny particles that are smaller than a nanometer.

[Slide 19] There are lots of different kinds of atoms, which are listed in a chart called the Periodic Table of Elements. Atoms can stick together to form molecules; this is called bonding.

[Slide 20] For example, when a sodium atom bonds to a chloride atom, you get a molecule of salt!

[Slide 21] Dan and Joel will use their juggling to teach us about atoms and molecules.

[Slide 22] Nano is too small to see with our eyes. Can you think of any tools we can use to see things that are very, very small? *[Teacher Note–Have students share their ideas. Make connections to tools they may have used in science class, or tools that scientists/engineers use on TV, in movies, or books they've read.]*

[Slide 23] Sometimes we can see really small things by using tools that magnify objects. To magnify means to make things look bigger. We can use a magnifying glass to magnify this bug–that means we make the bug look bigger so we can see it better. But things that are nano are too small to see with a magnifying glass.

[Slide 24] Microscopes are tools that help us see things that are too small to see with just our eyes. But things that are nano are too small to see even with this kind of microscope. You have to use a very special microscope to see things that are nano.

[Slide 25] Dan and Joel will teach us about a very special microscope in the juggling show!

[STOP HERE FOR YOUNGER STUDENTS OR FOR A SHORTER INTRO]

[Slide 26] Now we know that nano means very, very small. Nano is also very different.

[Slide 27] Different forces dominate at the nanoscale, making things behave in unexpected ways. An example of a force is gravity. Without gravity you would float around in the air. When things are very, very small gravity can be a less important force. For example, geckos can climb up walls and across ceilings, but there's no glue on the bottom of their feet! Instead, millions of tiny, nano-sized "hairs" help them stick to the wall. *[These tiny structures, called setae, are only about 200 nanometers wide. Molecules in the setae are attracted to molecules in the wall, and they form a temporary bond. While each bond is weak, there are enough setae that the intermolecular forces overcome the force of gravity. To move, the gecko tilts its foot, breaking the bonds.]*

[Slide 28] There are other ways that small things act differently from big things. Nano-sized things are more reactive than big things. An example of a reaction is when you see rusty metal. This is because of a chemical reaction that happens between the metal and the oxygen in the air. When a material is nano-sized, chemical reactions often go faster. That's because reactions occur on the surface of objects, and nanoscale objects have a lot of surface area compared to bigger objects. Aluminum, used every day in drink cans, can be explosive when the aluminum particles are nano-sized!

[Slide 29] Dan and Joel will also talk about how scientists and engineers study and make nano-sized things. This is called nanotechnology.

[Slide 30] Computer chips are a good example of nanotechnology we use every day. Intel currently makes computer chips with tiny features that are only around 30 nanometers across. 60 million transistors this small can fit on the head of a pin! This is about as small as we can go with current manufacturing techniques. To make even smaller, faster chips, we'll need new technologies.

[Slide 31] Nanotechnologies could transform the ways we create, transmit, store, and use energy. Some scientists think nanotechnology will allow us to build ultra-efficient transmission lines for electricity, produce more effective and inexpensive solar cells, make cheap and efficient biofuels, and improve the safety of nuclear reactors. But more research and investment are needed before nano energy solutions can be developed or widely distributed.

[Slide 32] Nanotechnology might lead to improvements in healthcare. Therapies using nano gold are currently in clinical trials with humans to treat cancer. In the therapy, nanometer-sized gold particles are injected in the blood and used with near-infrared light to heat and kill tumors with very little harm to nearby tissue.

[Slide 33] Another new use for nanotechnologies is in water filters.

[Slide 34] Advances in nanotechnology may impact our economy, environment, and personal lives.

[Slide 35] The discussion of how nanotechnology is to be part of our society and our future is the responsibility of everyone, not just scientists and engineers. Since nanotechnology is already in products that we use–like computers or medicine or even sunblock–we are already making decisions about whether or not to use nanotechnologies, though we may not always know it.

[Slide 36] Let's review what we've learned. What do you remember about nano?

More Classroom Activities & Extensions

The following fun activities can serve as pre- or post-show classroom enrichment and can be modified to meet your students' needs. They have been tested and shown to be engaging and effective. **The activity guides and all printable resources can be found in the Classroom Activities & Extensions PDF that supplements this guide (ANB_ActivityGuide.pdf).** These activities were excerpted from The National Informal STEM Education Network's (NISE Network) Programs and Activities Catalog (http://www.nisenet.org/search/product_type/programs-and-activities-10) and the NISE Network *DIY Nano* book (http://www.nisenet.org/catalog/diy-nano-book). They are designed to be easily edited and adapted for different audiences under a Creative Commons Attribution Non-Commercial Share Alike license.

Grade Levels	Activity Description	Activity Guide Pg.
K – 2	**Try Measuring Little Things:** In this hands-on activity, students use a special ruler to measure tiny things, like a pencil eraser or button. The ruler measures in millimeters, which are very small, but a nanometer is a million times smaller than a millimeter! **Learning goals:** Nano means very, very small A nanometer is a billionth of a meter Full activity from NISE: http://www.nisenet.org/catalog/try-measuring-little-things-nanodays-2012	5 – 6
K – 2	**I Spy Nano:** In this worksheet activity, students learn about products that have been enhanced with nanotechnology by finding hidden objects in a picture. **Learning goals:** Nano means very, very small Nanotechnology is making and studying materials at the nanoscale Full activity from NISE (in DIY Nano): http://www.nisenet.org/catalog/diy-nano	35 – 36
K – 5	**How Big is Your Hand:** In this worksheet activity, students measure their hand in centimeters and nanometers. They can also use the worksheet to measure other small objects and learn that even small things are millions of nanometers long! **Learning goals:** Nano means very, very small A nanometer is a billionth of a meter Full activity from NISE: http://www.nisenet.org/catalog/programs/exploring_size_-_measure_yourself	7

Grade Levels	Activity Description	Activity Guide Pg.
K – 5	**Ready, Set, Fizz:** In this activity, students conduct a simple hands-on experiment using large and small pieces of effervescent antacid tablets to discover that small things are more reactive than big things. **Learning goals:** Materials act differently at the nanoscale A nanometer is a billionth of a meter Full activity from NISE: http://www.nisenet.org/sites/default/files/catalog/uploads/9881/diy_nano_print_fizz_03_21.pdf	27 – 30
K – 5	**Mystery Shapes:** In this hands-on activity, students learn how a scanning probe microscope works by using their sense of touch to identify objects that are hidden out of sight in a bag or box. **Learning goals:** Nano is too small to see Scientists need special microscopes to "see" things at the nanoscale A nanometer is a billionth of a meter Full activity from NISE: http://www.nisenet.org/catalog/programs/exploring_tools_-_mystery_shapes_nanodays_2013	31 – 34
3 – 8	**Tiny Ruler & Cutting it Down to Nano:** In these hands-on activities, students attempt to cut a paper ruler down to the nanoscale. The goal of the activity is to cut the ruler in half as many times as possible. Most people can only make about 7 cuts to the paper, resulting in a piece of paper about 1 millimeter, but a nanometer is one million times smaller than a millimeter! It would take 27 cuts to get down to the nanoscale! **Learning goals:** Nano is too small to see A nanometer is a billionth of a meter Scientists need special tools to work at the nanoscale Full activity from NISE: http://www.nisenet.org/catalog/exploring-size-tiny-ruler-nanodays-08-09-10 Similar activity from NISE (Cutting it Down to Nano) with worksheet: http://www.nisenet.org/catalog/cutting-it-down-nano	8 – 10

Grade Levels	Activity Description	Activity Guide Pg.
3 – 8	**What Am I? Mystery Cards:** In this hands-on activity, students flip between macro and nanoscale images of familiar objects on cards to learn about concepts in nanoscience and nanotechnology. **Learning goals:** Things at the nanoscale behave differently than bigger things Nanotechnology is making and studying materials at the nanoscale A nanometer is a billionth of a meter Full activity from NISE: http://nisenet.org/catalog/what-am-i-mystery-cards	37 – 46
5 – 8	**Powers of Ten:** This card game activity explores the relative sizes of objects. Students compete to organize their hand of cards into lists of objects from largest to smallest. This activity is recommended for upper-elementary and middle school students, but it can be adapted for younger grades by simply sorting images from largest to smallest. **Learning goals:** The size of an object is important A nanometer is a billionth of a meter Full activity from NISE: http://www.nisenet.org/catalog/programs/exploring_size_-_powers_ten_game_nanodays_2011_2012_2014	11 – 26
6 – 8	**Nano and Society Posters:** In this interactive discussion activity, students explore the relationship between nanotechnology and society. Posters with text and images are used to spark conversations about how nanotechnology will affect our lives and what the risks and benefits of different technologies might be. **Learning goals:** Nanoscience and nanotechnology are relevant to our lives Nanoscience and nanotechnology are leading to new products and innovations As with any new technology, we should be aware of potential risks. Full activity from NISE: http://www.nisenet.org/catalog/nano-society-posters	47 – 59

Additional Online Resources

This is a suggested resource list for teachers looking to learn more about nanoscale science and engineering.

Websites:

What Is Nano?
http://whatisnano.org/

Nanooze Magazine
http://www.nanooze.org/

NISE Network (Browse by Topic – Nanotechnology)
http://www.nisenet.org/

NNIN K-12 Teacher Resources
http://www.nnin.org/education-training/k-12-teachers

National Nanotechnology Initiative
http://nano.gov/education-training/teacher-resources

Videos:

Intro to Nano (for older students)
https://vimeo.com/channels/nisenet/11362918

How Small is Nano? (for younger students)
https://vimeo.com/channels/nisenet/12031427

NanoNerds YouTube Channel
https://www.youtube.com/user/NanoNerds

- One talk on the channel that we recommend is called “Moving Atoms” and it features Don Eigler, who invented the Scanning Probe Microscope and demonstrates it live onstage at the Museum of Science, after giving a simple and elegant introduction to atoms.

  https://youtu.be/iVaq2UWzZmw OR https://vimeo.com/12031790

Questions? Feel free to contact the Amazing Nano Brothers team at nano@mos.org.