Summer Camp Framework

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General Description

Audience:

Summer campers and other groups of children ages 8 to 10 (grades 2 through 5).

Type of program:

Campers learn about nanoscale science and engineering through hands-on activities. The framework can be delivered in 5 half-day (1.5 – 2 hour) sessions. Alternately, the sessions do not have to be delivered consecutively. The first session (Intro to Science and Technology on the Nanoscale) can be used on its own or paired with any of the other four sessions.

If the framework is delivered as 5 half-day sessions, each day involves some review and deepening of concepts covered in previous days.

In general, the Exploring Size: Powers of Ten game can be used everyday to fill time or few campers who have finished early.

Program Objectives

Learning Objectives:

Session 1: Intro to Science and Technology on the nanoscale

As a result of participating in this session, campers will understand that

- A nanometer is one-billionth of a meter. Nanometer-sized things are very small.
- Nanometer-sized things often behave differently than larger things do.

Session 2: Nanoscale science in nature

As a result of participating in this session, campers will understand that

- Nanometer sized things exist in nature
- Nanotechnology and materials can be inspired by nature

Session 3: Manipulating things at the Nanoscale

As a result of participating in this session, campers will understand that

- Nanoscientists and engineers study and make tiny things less than 100 nanometers in size.
- Sometimes nanotechnologies and materials can be built from individual atoms!
- The two main ways to make nanoscale objects and devices are known as top-down and bottom-up techniques.

Session 4: Scientists use special tools to work on the nanoscale

As a result of participating in this session, campers will understand that

- Specialized microscopes allow scientists to observe nanoscale structures
- Scientists and engineers need to use special tools to build on the nanoscale.

Session 5: Nanotechnology leads to new knowledge and innovations

As a result of participating in this session, campers will understand that

- Some products already have nanometer sized materials in them
- Researchers and engineers are using nanoscale science to produce new and/or improved materials
- There are costs, risks and benefits of nanoscale science and engineering
- Our choices as consumers and citizens affect the development of nanotechnologies

At a Glance:

Day 1:

Introduction to Science and Technology on the Nanoscale

- Intro to Nano Cart Demo (NanoDays 2012)
  - Including:
    - Exploring Materials: Nano Gold (NanoDays 2012)
    - Exploring Forces: Static
    - Exploring Structures: Butterfly (NanoDays 2012)
    - Exploring Materials: Graphene (NanoDays 2012)
    - Exploring Size: Ball Sorter
    - Exploring Products: Sunblock
- Exploring Size: Measure Yourself
- Exploring Size: Scented Balloons
- Exploring Properties: Surface Area
- Exploring Forces: Gravity
- Exploring Materials: Ferrofluid
- Exploring Materials: Nano Sand
- Exploring Size: Memory Game

Day 2

Nanoscale Science in Nature

- Video: Nanotechnology What's the Big Deal?
- Snowflakes: Nano at its Coolest!
- Biomimicry: Synthetic Gecko Tape Through Nanomolding (activity)
- Exploring Structures: Butterfly (NanoDays 2012
- Exploring Materials: Thin Films
- Exploring Products: Nano Fabric and Extension
- Plant nasturtium seeds

Day 3:

Manipulating things at the nanoscale.

- DNA Nanotechnology
- Sweet Self-Assembly

Outdoors:

- Exploring Fabrication: Self-Assembly
- Photolithography – sun prints

Day 4:

Scientists use special tools to work on the nanoscale

- Shrinking Robots
- Exploring Tools: Special Microscopes
- Exploring Tools: Mitten Challenge
- Exploring Size: Powers of Ten Game

Day 5

Nanotechnology leads to new knowledge and innovation

- Wheel of the Future
- Exploring Products: Sunblock
- Exploring Products: Graphene (NanoDays 2012)
- Exploring Size: Memory Game

NISE Network content map main ideas:

[x] 1. Nanometer-sized things are very small, and often behave differently than larger things do.

[x] 2. Scientists and engineers have formed the interdisciplinary field of nanotechnology by investigating properties and manipulating matter at the nanoscale.

[x] 3. Nanoscience, nanotechnology, and nanoengineering lead to new knowledge and innovations that weren't possible before.

[x] 4. Nanotechnologies have costs, risks, and benefits that affect our lives in ways we cannot always predict.

National Science Education Standards:

[x] 1. Science as Inquiry
- [x] K-4: Abilities necessary to do scientific inquiry
- [x] K-4: Understanding about scientific inquiry
- [x] 5-8: Abilities necessary to do scientific inquiry
- [x] 5-8: Understanding about scientific inquiry
- [x] 9-12: Abilities necessary to do scientific inquiry
- [x] 9-12: Understanding about scientific inquiry

[x] 2. Physical Science
- [x] K-4: Properties of objects and materials
- [x] 5-8: Properties and changes of properties in matter
- [x] 9-12: Structure and properties of matter

[x] 3. Life Science
- [x] K-4: Characteristics of organisms
- [x] 5-8: Structure and function in living systems
- [x] 5-8: Diversity and adaptations of organisms

- [x] 4. Earth and Space Science
  - [x] K-4: Properties of earth materials

- [x] 5. Science and Technology
  - [x] K-4: Understanding about science and technology
  - [x] 5-8: Understanding about science and technology
  - [x] 9-12: Understanding about science and technology

- [x] 6. Personal and Social Perspectives
  - [x] K-4: Science and technology in local challenges
  - [x] 5-8: Risks and benefits
  - [x] 5-8: Science and technology in society
  - [x] 9-12: Science and technology in local, national, and global challenges

- [x] 7. History and Nature of Science
  - [x] K-4: Science as a human endeavor
  - [x] 5-8: Science as a human endeavor
  - [x] 9-12: Science as a human endeavor

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Background Information

Definition of terms

Nano is the scientific term meaning one-billionth (1/1,000,000,000). It comes from a Greek word meaning “dwarf.”

A nanometer is one one-billionth of a meter. One inch equals 25.4 million nanometers. A sheet of paper is about 100,000 nanometers thick. A human hair measures roughly 50,000 to 100,000 nanometers across. Your fingernails grow one nanometer every second.

(Other units can also be divided by one billion. A single blink of an eye is about one-billionth of a year. An eyeblink is to a year what a nanometer is to a yardstick.)

Nanoscale refers to measurements of 1-100 nanometers. A virus is about 70 nm long. A cell membrane is about 9 nm thick. Ten hydrogen atoms are about 1 nm.

At the nanoscale, many common materials exhibit unusual properties, such as remarkably lower resistance to electricity, or faster chemical reactions.

Nanotechnology is the manipulation of material at the nanoscale to take advantage of these properties. This often means working with individual molecules.

Nanoscience, nanoengineering and other such terms refer to those activities applied to the nanoscale. “Nano,” by itself, is often used as short-hand to refer to any or all of these activities.

Session 1: Introduction to Science and Technology on the Nanoscale

A nanometer is one-billionth of a meter. Things on this scale are too small to see, even with very powerful light microscopes. Nanometer-sized things often behave differently than larger things do.

Materials

See detailed materials lists, sources and set-up in the lesson plans and activity guides that can be downloaded from www.nisenet.org

Set Up

Time: 30 – 60 minutes

Follow the step-by-step explanation of how to prepare for each of the activities provided in the activity guides and lesson plans that can be downloaded from www.nisenet.org

Program Delivery

Safety

Review specific safety precautions for each activity, as outlined in the individual lesson plan or activity guide that can be downloaded from www.nisenet.org.

Talking Points and Outline:

To introduce the nanoscale and to get an idea of what makes the nanoscale different we can watch a presentation.

Intro to Nano presentation introduces the basics about nanoscale science and technology. Campers learn that nanoscale objects are very small and have surprising properties because of their size. They also learn that working with such tiny materials may lead to new technologies.
http://www.nisenet.org/catalog/programs/intro_nano_cart_demo

To get a sense of the super tiny scale of nanotechnology and nanoscale science, we can measure ourselves in nanometers.

Exploring Size: Measure Yourself is a hands-on activity in which campers mark their height on a height chart and discover how tall they are in nanometers.
http://www.nisenet.org/catalog/programs/exploring_size_-_measure_yourself_nanodays_08_09_10_11

We cannot see particles that are nanometers in size, but we can observe these very small particles by using our sense of smell.

Exploring Size: Scented Balloons lets campers use their sense of smell to explore the world on the nanoscale. They learn that we can smell some things that are too small to see, and that a nanometer is a billionth of a meter.
http://www.nisenet.org/catalog/programs/exploring_size_-_scented_balloons_nanodays_2010_2011

Extension: Smell the Difference (5 minutes) demonstrates that very small changes in molecules, in this case left-handed and right-handed versions of common scented molecules can cause noticeable changes in smell.
http://americanhistory.si.edu/kids/molecule/04exp.htm

Materials behave in a different way at a small scale than they do at a larger scale. At the nanoscale, a material may exhibit different properties. We can explore some of the ways properties change when a material becomes small by doing a number of activities.

Exploring Properties: Surface Area is a hands-on activity demonstrating how a material can act differently when it's nanometer-sized. Campers compare the reaction rate of an effervescent antacid tablet that is broken in half with one that is broken into many pieces.
http://www.nisenet.org/catalog/programs/exploring_properties_-_surface_area_nanodays_08_09_10

Exploring Forces: Gravity is a hands on activity in which campers discover that it's easy to pour water out of a regular-sized cup, but not out of a miniature cup. They learn that size can affect the way materials like water behave.
http://www.nisenet.org/catalog/programs/exploring_forces_-_gravity_nanodays_08_09_10
Extension: Campers can try the activity with the Mason jar from the "**Intro to Nano**" presentation. Replace the lid of a mason jar with screen. Immerse the jar in water. Lift the jar upside down, completely vertically from the water; the water will not flow out through the screen. This is because the tiny holes in the screen, helped by air pressure, do not allow the water to flow out. **http://www.nisenet.org/catalog/programs/intro_nano_cart_demo**

Exploring Materials: Ferrofluid is a hands-on activity demonstrating that a material can act differently when it's nanometer-sized. Campers investigate the properties of Ferro fluid and magnetic black sand, learning that the surprising difference in the behavior of these two materials is due to size. **http://www.nisenet.org/catalog/programs/exploring_materials_-_ferrofluid_nanodays_08_09_10_11**

Exploring Materials: Nano Sand is a hands-on activity exploring how water behaves differently when it comes in contact with nano sand and regular sand. Campers learn about the hydrophobic properties of nano sand.
http://www.nisenet.org/catalog/programs/exploring_products_-_nano_sand_nanodays_2011

To wrap-up and review, campers play a card game.

Exploring Size - Memory Game explores the different size scales - macro, micro and nano - objects within these different scales and the way these objects are measured. Campers compete to find matching pairs of cards.
http://www.nisenet.org/catalog/programs/exploring_size_-_memory_game_nanodays_2011

Tips and troubleshooting

The “Intro to Nano” cart demonstration should be presented at the beginning of the session to the entire group.

If there is enough staff, the activities can be set up as a “round robin” so campers can rotate in small groups from one activity to another. This requires that the staff (camp counselors) be comfortable with the individual activities. If there is not enough staff to “man” each of the activities, the group can complete each of the activities together.

Whole Group:

- Intro to Nano Cart Demo

Round Robin:

- Exploring Size: Measure Yourself
- Exploring Size: Scented Balloons
- Exploring Properties: Surface Area
- Exploring Forces: Gravity
- Exploring Materials: Ferrofluid
- Exploring Materials: Nano Sand
- Exploring Size: Memory Game

Session 2: Nanoscale Science in Nature

Nanotechnology and materials can be inspired by nature. Investigate pants and plants that repel dirt and water, and find out how nano-sized "whiskers" on fabric can keep your clothes stain-free. Explore the beautiful iridescent color of the Blue Morpho butterfly, and learn about new display technologies that mimic the butterfly's wings. Find out how nanoscale materials are built by nature.

Materials

See detailed materials lists, sources and set-up in the lesson plans and activity guides that can be downloaded from www.nisenet.org

Set Up

Time: 30 – 60 minutes

Follow the step-by-step explanation of how to prepare for each of the activities provided in the activity guides that can be downloaded from www.nisenet.org

Program Delivery

Safety

Review specific safety precautions for each activity, as outlined in the individual lesson plan or activity guide that can be downloaded from www.nisenet.org.

Talking Points and Outline:

To remind campers of the unique challenges and opportunities presented by nanoscale science, and the super tiny scale of nanotechnology we can watch the video **Nanotechnology: What's the Big Deal?" http://www.nisenet.org/catalog/media/intro_nano_video**

Today we will be looking at nanoscale structures in nature and the ways scientists are inspired by nature to try to make new materials by copying nature (biomimicry).

Scientists are working to make materials that use gecko-like nano-structures for adhesion. The toes of a gecko are divided into nanoscale hair-like structures. When a gecko places its foot on the wall and curls its toes, these nanoscale structures interact with the wall on the atomic level. The forces (van-der-waals forces) between the nano-structured hairs of the gecko foot and the atoms of the wall are strong enough to hold up the gecko.

Campers are encouraged to examine this property of the gecko foot and how it can be used in new materials. **Biomimicry: Synthetic Gecko Tape Through Nanomolding** is a hands-on activity making a synthetic gecko tape with micron sized hairs that mimics that behavior of the gecko foot.

The tape should be made in advance. Campers can test the pre-made gecko tape to see how well it works. If possible, bring in a live gecko to allow campers to observe its feet and how it walks on walls.
http://www.nisenet.org/catalog/programs/biomimicry_synthetic_gecko_tape_through_nanomolding

Another natural phenomenon caused by structures on the nanoscale is the ability of some leaves, like from lotus, nasturtium or kale, to repel water. These leaves display the lotus effect, a self-cleaning, water-repellant property. Scientists have discovered that this property arises from nanometer-sized waxy bumps on the surface of each leaf, preventing dirt and water from adhering. Engineers have duplicated this lotus effect in numerous products like fabrics that are coated with nanometer-sized “whiskers” that protect them from stains. Nano fabrics are an example of nanotechnology—along with self-cleaning paint and windows—that mimic the water-repelling “lotus effect” of some plant leaves.

In the **Exploring Products: Nano Fabric** activity, campers drop water on regular fabric and Nano fabric as they explore the lotus leaf effect. Campers will also observe the lotus leaf effect by dropping water on lettuce and kale and leaves (which is the extension activity) **http://www.nisenet.org/catalog/programs/exploring-materials-nano-fabrics** Campers then plant nasturtium seeds in small containers to take home.

Nature builds nanoscale structures using self-assembly. An example of a natural molecule that self-assembles is a snowflake. **Snowflakes: Nano at its Coolest!** is a presentation where campers learn that the complex structure of snowflakes results from the nanoscale arrangement of water molecules in an ice crystal, and that snowflakes are examples of self-assembled systems studied by nanoscientists. During the program, campers watch videos of

snowflakes growing and observe real ice crystals growing in a chilled chamber**.**
http://www.nisenet.org/catalog/programs/snowflakes_nano_at_its_coolest

A Blue Morpho Butterfly appears to have blue wings but when you shine the light through the wing from the underside, the bright blue color disappears and the wing looks brown. That's because the blue color of the butterfly wings is not the result of blue pigment. The butterfly's wings are made of tiny, overlapping scales. The size and arrangement of the super thin scales makes them look blue—but they're actually transparent! There's an air space of a few nanometers between each layer of scales.

Light waves bouncing off the top and bottom surfaces of neighboring scales interfere with each other. Most light waves are cancelled and only certain wavelengths—or colors—bounce back to your eyes. So when you look at the front of the butterfly, it's a beautiful, iridescent blue.

The backside of the butterfly's wings is brown, colored by pigment. Light passing through the wings reveals the brown underside. Campers can see this when using a Blue Morpho butterfly placed on a light box.

Campers learn that a thin film creates iridescent, rainbow colors. **"Exploring Materials - Thin Films"** is a hands-on activity in which campers create a colorful bookmark using a super thin layer of nail polish on water.
http://www.nisenet.org/catalog/programs/exploring_materials_-_thin_films_nanodays_2011

Tips and troubleshooting

If there is enough staff, some of the activities can be set up as a "round robin" so campers can rotate in small groups from one activity to another. This requires that the staff (camp counselors) be comfortable with the individual activities. If there is not enough staff to "man" each of the activities, the group can complete each of the activities together.

Whole Group:

- Video: Nanotechnology What's the Big Deal?
- Snowflakes: Nano at its Coolest!
- Biomimicry: Synthetic Gecko Tape Through Nanomolding (activity)

Round Robin:

- Blue Morpho Butterfly
- Exploring Materials: Thin Films
- Exploring Products: Nano Fabrics
- Plant nasturtium seeds

Take home:

- Nasturtium seeds planted in cups

Session 3: Manipulating Things at the Nanoscale

Scientists and engineers have formed the interdisciplinary field of nanotechnology by investigating properties and manipulating matter at the nanoscale. Nano researchers have

developed new ways to manipulate matter at the nanoscale. These techniques fall into two broad categories, known as “bottom-up” and “top-down” approaches.

Materials

See detailed materials lists, sources and set-up in the lesson plans and activity guides that can be downloaded from www.nisenet.org

Set Up

Time: 60 minutes

Follow the step-by-step explanation of how to prepare for each of the activities provided in the activity guides that can be downloaded from www.nisenet.org

Program Delivery

Safety

Review specific safety precautions for each activity, as outlined in the individual lesson plan or activity guide that can be downloaded from www.nisenet.org.

Talking points and outline

Start by reviewing the definition of nanoscale science.

Today we are going to look at ways that nanoscale material can be built.

All matter is made of atoms, which are particles much too small to see even with a light microscope. Molecules can be built from smaller building blocks; atoms. This process can involve certain materials under specific conditions spontaneously assembling themselves. Remember in the last session we looked at how snowflakes grow by self-assembly. We can review this process of self-assembly by playing a game.

Exploring Fabrication: Self Assembly includes several full-body interactive games campers can play to model the process of self-assembly in nature and nanotechnology. Visitors learn that self-assembly is a process by which molecules and cells form themselves into functional structures. **http://www.nisenet.org/catalog/programs/exploring_fabrication_-_self-assembly_nanodays_10**

The "**Sweet Self-Assembly**" program focuses on the creation of macrocapsules using self-assembly techniques. Campers make macrocapsules using techniques similar to those being used in laboratories to make nanocapsules or “smart drugs”.
http://www.nisenet.org/catalog/programs/sweet_self-assembly

An example of a molecule that naturally self-assembles is DNA.

DNA Nanotechnology is a hands-on activity exploring DNA (deoxyribonucleic acid), a nanoscale structure that occurs in nature. Campers extract a sample of DNA from split peas and put it in an Eppendorf tube to take home. They learn that nanoscientists study DNA to understand its

biological function, and that they also use it to make other nanoscale materials and devices.
http://www.nisenet.org/catalog/programs/dna_nanotechnology

Another way that nanoscale structures can be created is by paring down larger blocks of material. This "top down" approach is used when creating a computer chip out of a large piece of silicon. Technicians accomplish this through lithography. Campers can examine the process of photolithography by making sun prints.
http://www.stevespanglerscience.com/product/sun-sensitive-paper

Tips and troubleshooting

All these activities can be done with the group as a whole.

Session 4: Scientists use special tools to work on the nanoscale

The dramatic growth of the fields of nanoscience and nanotechnology has been made possible by the recent development of specialized tools by scientists and engineers. Nanoscale structures can be observed by using specialized microscopes, like the Scanning Probe Microscopes (SPM) and Atomic Force Microscopes (AFM).

Materials

See detailed materials lists, sources and set-up in the lesson plans and activity guides that can be downloaded from www.nisenet.org

Set Up

Time: 60 minutes

Follow the step-by-step explanation of how to prepare for each of the activities provided in the activity guides that can be downloaded from www.nisenet.org

Program Delivery

Safety

Review specific safety precautions for each activity, as outlined in the individual lesson plan or activity guide that can be downloaded from www.nisenet.org

Talking points and outline

Start by reviewing the definition of nanoscale science.

Nanoscience and nanotechnology has been made possible by the development of specialized tools. Nanoscale structures can be observed by using specialized microscopes, like the Scanning Probe Microscopes (SPM) and Atomic Force Microscopes (AFM). We can learn about the way scientists can make observations about a material without being able to see it with their eyes.

Exploring Tools - Special Microscopes is a hands-on activity in which campers use a flexible magnet as a model for a scanning probe microscope. They learn that SPMs are an example of a special tool that scientists use to work on the nanoscale.

http://www.nisenet.org/catalog/programs/exploring_tools_-_special_microscopes_nanodays_08_09_10_11

Exploring Tools - Mitten Challenge is a hands on activity in which campers build a Lego® structure while wearing mittens. They learn that it is difficult to build small things when your tools are too big. **http://www.nisenet.org/catalog/programs/exploring_tools_-_mitten_challenge_nanodays_2011**

Shrinking Robots! explores the possibility of nanobots. Campers learn what a robot is and how small real robots are today. They also learn that nanobots don't exist (yet) and consider some of the challenges in creating nano-sized robots. If time allows, campers can design and build a robot toy from recycled and craft materials.
http://www.nisenet.org/catalog/programs/shrinking_robots

Some nanoscale science and technology is done in the controlled environment of a clean room. To get an idea of what a scientist wears in a clean room, campers try on the head-to-toe suits that scientists wear in clean rooms, and manipulate pretend silicon wafers with tweezers. This is excerpted from the program: **Tiny Particles, Big Trouble!**
http://www.nisenet.org/catalog/programs/tiny_particles_big_trouble

Tips and troubleshooting

If there is enough staff, some of the activities can be set up as a "round robin" so campers can rotate in small groups from one activity to another. This requires that the staff (camp counselors) be comfortable with the individual activities. If there is not enough staff to "man" each of the activities, the group can complete each of the activities together.

Whole Group:

- Shrinking Robots (Presentation)

Round Robin:

- Exploring Tools: Special Microscopes
- Exploring Tools: Mitten Challenge
- Clean room dress-up with photos
  - Craft: decorate photo frame
- Exploring Size: Powers of Ten Game

Take home:

- Dress-up Photo in frame

Session 5: Nanotechnology leads to new knowledge and innovations

In the field of nanotechnology, researchers and engineers take advantage of the change in properties at the nanoscale to produce new and/or improved materials and devices in areas such as computing, medicine, energy, the environment, and manufacturing.
Through our choices as consumers and citizens, we affect the development of nanotechnologies. Government, companies, and individuals can all be involved in guiding the development and regulation of nanotechnologies.

Materials

See detailed materials lists, sources and set-up in the lesson plans and activity guides that can be downloaded from www.nisenet.org

Set Up

Time: 60 minutes

Follow the step-by-step explanation of how to prepare for each of the activities provided in the activity guides that can be downloaded from www.nisenet.org

Program Delivery

Safety

Review specific safety precautions for each activity, as outlined in the individual lesson plan or activity guide that can be downloaded from www.nisenet.org

Talking points and outline

Campers are contestants in a game show, **Wheel of the Future** that reviews material they have already seen at camp and allows them to learn more about nanotechnology. The three rounds cover an introduction to nanotechnology, provide information on solar cells, and express the concerns people have for nanotechnology. New rounds of information can be added as needed.
http://www.nisenet.org/catalog/programs/wheel_future

Nanoscientists and engineers are using some of the new properties to make new materials. We can examine some of those new materials.

Exploring Products - Sunblock is a hands-on activity comparing sunblock that contains nanoparticles to ointment. Campers learn how some sunblocks that rub in clear contain nanoparticles that block harmful rays from the sun.
http://www.nisenet.org/catalog/programs/exploring_products_-_sunblock_nanodays_2011

Exploring Products – Graphene is a hands-on activity in which campers make very thin layers of graphite—and maybe even some graphene, the thinnest material that exists! Graphene is a single layer of carbon atoms arranged in a honeycomb pattern. They then explore the conductivity of graphite by including a thin layer of graphite as a conductor in an electric circuit.

Tips and troubleshooting

All these activities can be done with the group as a whole.

Going further…

Here are some resources you can share with your visitors:

- **NanoVenture Game**
  http://www.nisenet.org/browse/catalog/results/nanoventure%20game

Universal Design

This program has been designed to be inclusive of visitors, including visitors of different ages, backgrounds, and different physical and cognitive abilities.

The following features of the program's design make it accessible:

[x] 1. Repeat and reinforce main ideas and concepts
- Content is repeated and reviewed each day, building on prior knowledge.

[x] 2. Provide multiple entry points and multiple ways of engagement
- The content is connected to campers' prior experiences and knowledge, and to their questions.
- Concise key phrases are used to support main ideas.
- Main ideas are presented through multiple senses (sight, hearing, and touch).
- Campers can stay at activities for more or less time to accommodate their needs.

[x] 3. Provide physical and sensory access to all aspects of the program
- Main ideas are presented through multiple senses (sight, hearing, and touch).
- Presentations are made accessible by using large, high-contrast text and images; using clear fonts and graphics; and using color to make distinctions.

To give an inclusive presentation of this program:

- Allow campers to spend as much or as little time as needed at each activity
- Repeat and reinforce main concepts and vocabulary

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