Animal Homes Design Project Digital Sampler

Project Guide

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If you are using Adobe Acrobat or the Adobe Acrobat Reader, you’ll have an easier time with navigation if you give yourself a “Previous View” button. This tool works like a Back button, and will allow you to retrace your jumps within the file so you don’t get lost.

Any text in blue is a link. Clicking blue text will take you to another page of the sample.

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Science Companion
The Engineering Design Project Series was developed to support compatible modules by allowing students to design and/or build animal homes, tools, machines, and designs of their own creation. Taking between 4-6 sessions, the projects strengthen skills and ideas about choosing materials, using tools, working with the limitations of materials, solving problems and overall project design.

Project Guide shows teachers how to integrate technology and design skills in a hands-on, inquiry format for their students. Through a series of sessions, students develop strong process and design skills.

The Project Guide brings teachers up to speed for the science content with the design project through “Teacher Background Information” and in-context session notes. Teachers can feel comfortable with leading the class—whether they have a long history of teaching science and engineering or not.

Each Project Guide focuses on a Big Idea. Through a series of different experiences and discussions over 4-6 sessions, students develop a deep understanding of the Big Idea by designing a project to demonstrate their understanding.

Sessions follow a consistent sequence.

- **Engage** – In this section of a session, the teacher introduces the topic. The goal is to briefly generate interest, activate prior knowledge, or link the day’s activities to what has come before.
- **Explore** – This is often (but not always) and hands-on exploration conducted in small groups.
- **Reflect and Discuss** – In this important section, the teacher and students discuss what they observed, share ideas and data, and reflect on the day’s activities. This portion of session brings the class back to the Big Idea.

You’ll find that while the session format is very consistent, students explore science content, engineering principles and the process of “doing science” in a large variety of ways.

You’ll also find that students LOVE the mix of active, hands-on, minds-on science.
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Assessments, Teacher Masters, and a Visual Pack are provided in a separate packet. They are also included on a CD in the back cover of this project guide.

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Some portions of the design project are not included in this sample.

Any text in blue is a link. Clicking blue text will take you to another page of the design project.
Teacher Background Information

**Introduction**

Animals use a variety of materials and designs when they build their homes. Animal homes range from the very simple—a depression scooped in the dirt so a bird’s eggs don’t roll away—to the very elaborate—a 100 year-old termite mound with air-conditioned tunnels.

Animals make or find homes that satisfy needs and help them survive. Many animal homes protect animals from wind and rain, heat or cold. They may protect the animal from predators, either by hiding the animal or keeping the predator out. Some animal homes are used mainly for the purpose of producing offspring, protecting vulnerable young animals, and providing the right conditions to feed them. Other animal homes are seasonal, used for hibernation during the winter months.

When an animal makes a home, it uses the materials available. Most animal homes use natural materials such as dirt, mud, rock, sand, leaves, sticks, and grass. If human-made materials are in the environment, they might be used by an animal as well, such as when birds use discarded fabric in their nests, or when mice make nests of shredded paper. Some animals use materials from their bodies in their homes. For example a spider spins a web, a termite glues soil together with its saliva, or a bird lines her nest with her own feathers.

When an animal makes a home, it uses its own body parts as tools. Prairie dogs use their claws and feet to excavate elaborate tunnels. Birds transport materials using their beak and wings, and build nests with their beak and feet.

Some animals don’t make their own homes at all. Some move into homes that other animals have made—either while the other animal is still there, or after the first animal has moved out. Other animals use their environment as they find it, taking refuge under a leaf or in a crack between rocks, or laying eggs in a stone depression.
Purposes of the Animal Homes Design Project

Designing an animal home, selecting materials, and building the home will be a fun activity that relates to a range of science content. Children can apply what they’ve learned about animals and their survival needs, as well as explore the properties and uses of materials.

As children design and build their animal homes, they should consider each of these aspects:

• The homes they make should meet animal needs. The children should think about how the home will protect the animal from weather or predators, be a safe place to produce offspring, or even (in the case of a spider web or a tunneling worm) help the animal obtain food.

• In planning the home, children should decide whether the home will be similar to one made by an animal. Will they use the same materials available to the animal? Or will they use tools and materials that are not available to the animal?

• As children select materials to make the homes, they should consider the properties of the materials they will use. Will the materials keep out the rain? Will they blend in with the environment to help hide the animal from predators? Will the materials keep the animal warm, or be strong enough to hold up to a stiff wind?

• While constructing the homes, children will need to use tools and solve problems. How might they cut or break the materials? How can they make these materials hold together? How will they make the home look the way they want it to look? Did they make an entrance that the animal can fit through?
Natural and Human-Made Materials and Objects

One opportunity the Animal Homes Design Project will give to children is to identify and use natural and human-made objects and materials.

A *natural object* is one that occurs in nature. Rocks, sticks, soil, branches, leaves, feathers, and eggshells are all examples of natural objects.

A *natural material* is one that occurs in nature. Wood, stone, sand, and metal are all natural materials.

People process natural materials to make *human-made materials*. A human-made material is one that is not found in nature. For example, plastic is made from petroleum by-products, and does not occur in nature. Concrete is manufactured by humans out of cement, gravel, and sand. Humans blend metals into alloys that are not found in nature. Humans use plant products such as cotton to make fabric.

People use natural and human-made materials to make *human-made objects*. A chair can be made out of wood (natural) and steel (human-made) and varnish (human-made).

The combinations of these terms make these categories difficult for the children to understand. They also create a challenge for children to correctly identify materials. For example, if a child ties sticks together with cotton string, he has made a human-made object (the thing he tied) out of natural objects (the sticks) and a human-made object (the cotton string). Rather than lead the students through these permutations, simply encourage them to be specific as they describe their materials. Rather than say “My nest is made of wood,” a child should say “My nest is made of twigs and branches.”

Examples of Animal Homes

The *Animal Homes Photo Cards* used in Session 1 feature a variety of homes built in different locations and from different materials. The information below provides basic details about the design, materials, body tools, and techniques that animals use to build those particular homes. Books you collect about animal homes for the children to use in Session 2 will contain a wider variety of details about these and other animal homes.
Teacher Note: In the paragraphs below, an animal name in bold indicates an animal featured in one of the Animal Homes Photo Cards.

Bird Nests

A female hummingbird builds its cup-shaped nest in the branches of a tree. Because hummingbirds are so small, the materials must be very lightweight in order for the bird to transport them to the nesting site. The bird chooses soft materials such as hair, feathers, strips of bark, and dandelion down. Many hummingbirds use spider silk to bind the materials in the nest together. The bird may place lichen or bits of bark around the outside, which helps the nest blend into its environment.

Many herons and egrets build nests out of twigs woven into platforms in tall trees.

Barn swallows construct their nests out of mud and grass, often choosing to build in the corners of human-made structures like barns or bridges. The birds pick up the mud with their beaks and fly it to the nesting site.

Mallards and other dabbling ducks build nests on the ground near rivers, ponds, lakes, and other wetlands. They choose places with tall vegetation that hides the nest. Rather than gathering materials from afar, they take materials close to the nest site, perhaps even grabbing what they can reach while sitting on the nest site.

Woodpeckers use their beaks to dig holes high in the trunks of trees. Then they nest inside the holes. Many woodpeckers only use a hole for one year, and then make another one the following year. The abandoned hole is then available for use by other animals.

Some birds, like the emperor penguin, don’t build nests at all. Other birds build nests inside pre-formed cavities. This is one reason some birds nest inside human-built birdhouses, which provide a safe place to build a nest.

Burrows

Meerkats live together in colonies of connected tunnels and chambers underground. They excavate the soil, digging with their long, strong claws. They line the inside of the burrow with insulating grass.

Several kinds of rodents live in similar underground colonies, including rabbits, gophers, prairie dogs, and naked mole rats.

Arctic foxes make their dens underground. In the summertime, the dens provide protection for the vulnerable fox babies. In the wintertime, the dens protect the arctic foxes from the frigid temperatures of their northern range.
Some birds also dig burrows. **Bank swallows** dig out tunnels for nesting in steep sand banks.

### Spider Webs

A spider can produce different kinds of silk from its spinnerets— for swinging from place to place, for wrapping prey, or for building a web. The silk used in the web is sticky, able to trap prey. Once a web ceases to be sticky the spider moves on, building a new web. Some spiders eat their old webs to conserve resources. Abandoned webs are called cobwebs.

### Insect Homes

While the word nest is usually associated with birds, the structures that **wasps** build out of pulverized wood mixed with saliva are also called nests. Wasp nests have multiple small chambers where the eggs and larvae are cared for by adults.

**Ants** dig networks of underground tunnels and chambers. Some species, like leafcutter ants, form huge mounds on top of their underground nests. The larger ant communities can contain millions of individuals.

**Termites** make nests using mixtures of mud, chewed wood, and saliva. Different species make homes in the branches of trees, decaying logs, or underground. Tunnels in the nests provide air circulation, temperature control, and moisture control. Termite species in tropical savannas of Africa and Australia build enormous termite mounds (also called termitaria) that persist over generations of termites and are used for decades. The mounds contain different rooms for nurseries and food storage. Some termites even farm fungus inside their mounds.

### A Unique Home

**Beaver** lodges are unique. Beavers cut down small trees with their teeth. They create beaver ponds by using the logs, branches, and mud to construct a dam across a stream. Then they build lodges in the middle of the pond, safe from predators that don’t like to swim. All entrances to the lodge are under water. The floor of the lodge’s interior is higher than the water level, making a dry den for beavers to sleep, raise their pups, and take refuge from cold weather.

The outer walls of the mound are woven of branches stabilized with mud. Beavers replace the mud from time to time. In winter, when the pond surface freezes, so does the mud. A predator that reaches the lodge still cannot break through the frozen lodge walls.
Have Fun!

The children in your classroom need not be limited to building homes like those in the examples provided. They may choose to use techniques exactly like the animals use—perhaps weaving grass together to make a lightweight nest. Or, they may use what they know about birds to create a bird house of human design and human-made materials. The important factors are that they design the home so that it meets their animal’s survival needs, and that they get experience choosing and using materials as they build their design.
Animal Homes Design Project

A QUICK LOOK

Overview
Children compare different animal homes. They note the materials the animal used to make the home, guess how the animal made the home, and think about how the home meets that animal’s needs. Choosing an animal, they design, build, and construct a home for that animal. Finally, they reflect on the materials they used and what they might do differently with different materials or more time.

Key Notes
- The activities for this project are spread over four sessions. You may use more sessions depending on the children’s interest and the complexity of their project.
- In Session 2, children look at books or web sites about animal homes and choose the animal that they would like to build a home for. Collect library books or select books from the Science Library on page 14, or plan for computer research time using links at www.sciencecompanion.com/links.

Big Idea
People and animals use materials to build homes.

Process Skills
- Communicating
- Comparing and contrasting
- Creating and using models
- Planning a process

Technology/Design Skills
- Choosing materials
- Designing and building
- Working with the limitations of materials
- Solving problems
Standards and Benchmarks

While designing, building, and presenting their animal homes, children develop Science and Technology Standard E (Abilities of Technological Design): “Identify a simple problem…Propose a solution…make proposals to build something or get something to work better…Implement proposed solutions…Evaluate a product or design…Communicate a problem, design, and solution.” They also work on another aspect of Standard E (Abilities to Distinguish between Natural Objects and Objects Made by Humans).

In addition as they choose materials for their project and compare these to the materials used by animals, children gain experience toward The Physical Setting Benchmark 4D (Structure of Matter): “Objects can be described in terms of their properties.”

Project Goals

1. Compare the materials, construction techniques, and uses of homes made by animals.
2. Choose appropriate materials and tools to construct animal homes.
3. Identify natural and human-made objects used in the project.
4. Construct an animal home that meets an animal’s needs.

Assessment Options

As the children present their animal homes in the final session, use the Designing and Building an Animal Home Checklist to evaluate their design and materials choices, whether the home meets the animal’s needs, and whether they can identify natural and human-made materials within their animal home.
## Materials

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom Supplies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chart paper or interactive whiteboard</td>
<td>1 or more</td>
<td>To record Animal Homes Idea Web. (Session 1)</td>
</tr>
<tr>
<td>Books or web sites about animal homes</td>
<td>Several</td>
<td>To conduct research and choose an animal for the project. (Session 2)</td>
</tr>
<tr>
<td>Human-made materials such as cardboard boxes, paper plates, yarn, string, modeling clay</td>
<td>Several</td>
<td>To build animal homes. (Session 3)</td>
</tr>
<tr>
<td>Natural materials such as sticks, long grasses, leaves, rocks, mud</td>
<td>Several</td>
<td>To build animal homes. (Session 3)</td>
</tr>
<tr>
<td>Fasteners such as glue, hot glue guns, twist ties, wire, string, staplers</td>
<td>Several</td>
<td>To build animal homes. (Session 3)</td>
</tr>
<tr>
<td><strong>Curriculum Items</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Animal Homes” Photo Cards (Session 1)</td>
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</tr>
<tr>
<td>Teacher Master “Animals Homes Idea Web—Samples” (Session 1)</td>
<td></td>
<td></td>
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<tr>
<td>Teacher Master “Planning My Animal Home” (Session 2)</td>
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<tr>
<td>Teacher Master “Request for Materials” (Session 2, optional)</td>
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<tr>
<td>Teacher Master “Animal Homes Presentation Questions” (Session 4, optional)</td>
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<td></td>
</tr>
<tr>
<td>Family Link “Making an Animal Home” (Session 2, optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checklist: Designing and Building an Animal Home (optional)</td>
<td></td>
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</tr>
</tbody>
</table>

### Preparation

**Session 1**

- Locate the “Animal Homes” Photo Cards.

- Be prepared to use an interactive whiteboard, overhead projector, or chart paper to map different kinds of animal homes during the discussion. (Refer the Teacher Masters “Animal Homes Idea Web—Samples” to see how a discussion can translate to a map.)

**Session 2**

- Collect books about animal homes, or plan for computer research time.

- Make one copy per group of the Teacher Master “Planning My Animal Home.”

- Decide whether you want to allow children to collect natural materials for the building project during their outdoor time after the lesson. If so, provide containers for collecting and storing the materials.
(Optional) Make copies of the Family Link “Making an Animal Home” for the children to take home. This family link invites families to learn more about the animal the child has chosen to make a home for, and to collect materials for the project. Write the date that you expect the class to make the animal homes before copying the master.

(Optional) Make copies of the Teacher Master “Request for Materials” to send home after Session 2.

Session 3
- Provide materials for children to make their animal’s home.
- Consider enlisting one or more parent volunteers or other assistants to use hot glue guns, supervise stapling, tie knots, or help in other ways to make this session both fun and safe.
- Depending on each project’s complexity, plan for additional construction time outside the regular science session for some children.

Session 4
- Prepare the children to move quickly though their presentations. If needed, conduct conferences with the children to explore the project and assess their performance. Then use the class time to let each pair or group cover a subset of the project questions. Consider giving them copies of the questions on the optional Teacher Master “Animal Homes Presentation Questions.”

Vocabulary
- **burrow** ................. A hole or tunnel dug underground by an animal for protection or shelter.
- **human-made object** Something that is not found in nature, such as cardboard, paper clips, string, or anything made of plastic.
- **natural object** ....... Something that is found in nature, such as sticks, rocks, dirt, grass, or leaves.
- **need** ................. Something an organism must have in order to stay alive.
- **nest** ................. A shelter to protect eggs and young animals.
- **predator** .............. An animal that hunts and eats other animals.
- **shelter** ............... Something that covers or protects.
Session 1—Looking at Animal Homes

Engage

1. Ask the children why they live in houses or apartments instead of outside. *(It's warmer inside, their homes shelter them from rain, their homes contain things that they use every day, etc.)*

2. Point out that animals have some of the same needs that people do. Define shelter. *(A shelter is something that covers or protects.)* Just like us, an animal's home provides them with shelter. Ask them to think about animal homes they have seen.
   - How did that home provide shelter for the animal?
   - Who made the animal's home?
   - What materials or objects was the animal's home made of?

Explore

1. Tell the class that today they’ll be looking at pictures of animals and the homes they build.

   **Teacher Note:** One of the “Animal Homes” Photo Cards shows photos of human-made homes for animals. It’s up to you whether to use this card for one group or omit it.

2. Distribute one photo card to each pair or group.
   - Children should think about and discuss how the home helps the animal meet its needs. Does it protect the animal from weather? From predators? How? How else does it help the animal?
   - Each group should think about and discuss how the animal made that home. What body parts did it use? Where did it get the materials? Encourage the children to guess if they don’t know.

3. Allow children to talk aloud for a few minutes as they look at the photo cards and generate ideas.
Reflect and Discuss

Sharing and Synthesizing

Make a class Animal Homes Idea Web of different kinds of animal homes. See the Teacher Masters “Animal Homes Idea Web—Samples” for ideas, but follow the class discussion for your own idea web (or webs). Encourage children to address the topics you asked them to consider while looking at the “Animal Homes” Photo Cards:

- How does the home help the animal meet its needs?
- How did the animal make the home? What body parts did it use? What materials did it use?

Management Note: Consider posting the “Animal Homes” Photo Cards around the classroom for the duration of the project to remind and inspire children of the great variety of animal homes in nature. If the class’s Animal Homes Idea Web (or Webs) is on chart paper, post that as well.

Big Idea

People and animals use materials to build homes.
Session 3—Making Animal Homes

Engage

Briefly focus the class on today’s task. Their job is to use the materials in the classroom to make an animal home for the animal they chose in the previous session. Outline your expectations for cooperation, sharing, and for safe use of tools such as hot glue guns or staplers.

Safety Note: Hot glue guns should only be used if they are handled by adult helpers. Children can bring materials to a hot glue station and direct adults how to attach the pieces.

Explore

Teacher Note: Depending on the time it takes children to build their animal homes, you may want to extend this portion of the project to two sessions, or give some groups extra time to finish outside of science time.

1. Before starting to build, review the materials on hand in the classroom.
   a. Ask children to gather materials at their workspace.
   b. Briefly define natural materials (things found in nature like sticks, grass, mud, or rocks) and human-made materials (things not found in nature like cardboard, paper, glue, paper clips, string, plastic).
   c. Have each group sort their materials into “natural objects” and “human-made objects.”
   d. Briefly discuss any questions that arise.

Teacher Note: It can be tricky to sort natural and human-made objects and materials because all human-made things use natural materials. See the Further Science Extension for an opportunity to spend more time with these concepts.

2. Circulate around the room as children build their animal homes. Assist if necessary and converse with the children about what they are working on.

Teacher Note: Children may take a variety of approaches. Some may make a human-made home, such as a decorated box for a hamster with a food cup and sleeping mat. Others may replicate what an animal would do, such as weaving grass or twigs into a nest. Others may make models of an animal home, perhaps gluing dirt over paper plates to simulate a den, and decorating with leaves and twigs. All of these are fine, but you should talk to the students about their choices. For example, “It looks like you’re making a human-made home for a pet. Have you given the pet all that it needs?” “You’re using the same materials that your animal uses when it builds its home.” “Oh, you’re making a model of a den. How is the size different from the animal’s real den? How are your materials different?”
Animal Homes Design Project

Assessments/Teacher Masters/Visual Packet
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Checklist: Designing and Building an Animal Home
Teacher Assessment

Determine whether the following skills are evident in the child’s approach to designing and building an animal home. You might assign one point for each criterion the child demonstrates. You can add specific observations or comments in the space below each criterion.

Name __________________________________ Date__________

Criteria:

_______ A. Demonstrates knowledge about the animal and its needs.

_______ B. Makes a plan for the home before starting construction.

_______ C. Considers the animal’s needs when selecting materials and designing the home.

_______ D. Identifies natural and human-made materials in their animal home.
Animal Homes Idea Web—Sample 1

Duck nest is hard to see.

Do they only live there when they lay eggs?

Birds use beaks, feet, and wings.

made by birds

Hamsters make nests too.

Wasps make nests too.

Wasp nests look like paper.

made of grass and moss

made of sticks

made of sticks and mud

Some nests have roofs.

How does it keep the rain off?

Predators can't reach high in tree.

Maybe the tree's leaves keep the rain off.
Animal Homes Idea Web—Sample 2

- Are there nests in the holes?
  - Some birds burrow in sand or trees.
  - Predators are too big to fit in the holes.
  - Keeps babies safe while they are young.
- Worms make them.
- Insects make them.
- Warm and dry inside.
- Burrow
- They dig with their claws.
  - Mammals make them.
  - Dig into dirt.
  - Do they dig with their teeth too?
  - Where do they put the dirt they dig out?
  - How do they keep it from falling in?
Spider Web

“Animal Homes” Photo Cards: Spider Web (Session 1)
Animal Homes Visual 1
Termite Mounds

“Animal Homes” Photo Cards: Termite Mounds (Session 1)
Animal Homes Visual 2
Barn Swallow Nests

“Animal Homes” Photo Cards: Barn Swallow Nests (Session1)
Animal Homes Visual 5

Photos: Photos.com
Hummingbird Nest
Woodpecker Hole

“Animal Homes” Photo Cards: Woodpecker Hole (Session 1)
Animal Homes Visual 9
Meerkat Burrow
Human—Made Animal Homes

Photo: Photos.com

“Animal Homes” Photo Cards: Human—Made Animal Homes (Session 1)
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Science Companion uses the “I Wonder” Circle to help students reflect on how they (and other scientists!) do science.

"I Wonder" Circle®
Doing Science

I Wonder: notice, ask questions, state problems
I Think: consider, gather information, predict
I Try: experiment, model, test ideas, repeat
I Observe: watch, examine, measure
I Record: record data, organize, describe, classify, graph, draw
I Discover: look for patterns, interpret, reflect, conclude, communicate discoveries
I Wonder...

What’s in Science Companion?

For the Teacher

- Human Body in Motion
  - Teacher Lesson Manual
- Human Body in Motion
  - Assessment Book
- My Science Notebook
  - Teacher Guide

**Teaching and Assessment**

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- Assessment Book
- Student Notebook Teacher Guide

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  - Teacher Reference Materials
  - Lesson O
- Teacher Masters
- Visual Aids
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<th>Category</th>
<th>Subject</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood</td>
<td>Rainbows, Color, and Light</td>
<td>Through experiments with prisms, mirrors, bubbles, water, sunlight, and flashlights, children bring rainbow effects into their classroom and onto the playground. They also mix colors to observe that colored light produces different results than mixing pigmented paints, dough, or water.</td>
</tr>
<tr>
<td>Life Science</td>
<td>Collecting and Examining Life</td>
<td>From collecting animal tracks to dissecting flowers, children deepen their understanding of what makes something alive as well as exploring the similarities and differences among living things.</td>
</tr>
<tr>
<td>Physical Science</td>
<td>Solids, Liquids, and Gases</td>
<td>While deciding what makes a solid a solid, watching water disappear from an open cup, or comparing various liquids, children find the value in asking questions and probing the world around them for meaningful answers.</td>
</tr>
<tr>
<td>Physical Science</td>
<td>Motion</td>
<td>Through activities that engage children’s bodies and minds, children move their own bodies in various ways to learn about motion, as well as build ramps, roll toy cars, drop and crash marbles, slide pennies and shoes, and even fly paper airplanes.</td>
</tr>
<tr>
<td>Life Science</td>
<td>Life Cycles</td>
<td>From watching a pea sprout to feeding apples to butterflies, children closely study four organisms, including humans, to observe the remarkable growth and change that living things experience during their life spans.</td>
</tr>
<tr>
<td>Early Childhood</td>
<td>Early Science Explorations</td>
<td>From making a collage of the leaves and seeds they find to constructing a lever from rocks and wood, children are introduced to the wonders of science and scientific exploration. Contains 7 studies in one book: Growing and Changing; Class Pet; Collections from Nature; Constructions; Dirt, Sand and Water; Sky and Weather; and My Body.</td>
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<tr>
<td>Earth Science</td>
<td>Weather</td>
<td>One day students learn to use a thermometer to record temperature, another day they measure rainfall or investigate the nature of ice. Throughout the year, students use their senses as well as scientific tools to discover that weather is a dynamic part of nature.</td>
</tr>
<tr>
<td>Physical Science</td>
<td>Magnets</td>
<td>From testing what sort of everyday objects are attracted to magnets to comparing the strength of different magnets, children deepen their observation skills while learning about the nature of magnets.</td>
</tr>
<tr>
<td>Earth Science</td>
<td>Rocks</td>
<td>One day children examine fossils, another day they might test minerals. As children collect, examine, describe, and experiment with rocks, minerals and fossils, they hone their observation skills and begin to unravel the puzzle of what rocks are and how they are formed.</td>
</tr>
<tr>
<td>Earth Science</td>
<td>Soils</td>
<td>From closely observing soil components and their properties to discovering the importance of earthworms, children use their senses of sight, smell, and touch to explore the wonders of soil.</td>
</tr>
</tbody>
</table>
### Habitats
From going on a nature walk to dissecting owl pellets, children are asked to think about how organisms (plants, animals, fungi, and microscopic living things) survive in the places they live, and how they interact with other living things.

### Light
Whether watching light “bend” a pencil in water or building a periscope, the combination of hands-on, multi-sensory learning enables children to understand what light is, how it behaves, and why it makes sight possible.

### Electrical Circuits
Whether exploring static charges, figuring out how to get a light bulb to light, or testing the conductivity of everyday objects, students experience firsthand the excitement of electricity and scientific discovery.

### Our Solar System
One day children chart the moon’s cycles, another day they might make a scale model of our solar system. By observing the world around them, they address questions such as “Why are there seasons?” and “Why does the moon appear to change shape?”

### Nature’s Recyclers
By watching composting worms create soil, to modeling the nutrient cycle, students have the opportunity to investigate the organisms that carry out the process of decomposition and recycle nutrients in an ecosystem.

### Watery Earth
Whether following a drop of water through the water cycle, measuring their own water usage, or exploring how filters clean dirty water, students are encouraged to use what they learn to have a positive impact on water resources.

### Earth’s Changing Surface
From building river models that explore erosion and deposition to touring the school grounds looking for evidence of the earth’s changing surface, students use hands-on investigations to discover the dynamic nature of the earth’s surface.

### Matter
With challenges like exploring what they can learn about an unknown substance called “Whatzit,” students experience the excitement of scientific discovery and gain an appreciation of the scientific method used by professional scientists.

### Human Body in Motion
By modeling how muscles move bones, testing reflexes, and measuring the effects of exercise on breathing and heart rate, students begin to appreciate the interactions between body parts and recognize the importance of protecting them by making healthy choices.

### Energy
Whether testing the efficiency of light bulbs, exploring heat conduction, or designing an imaginary invention demonstrating the transfer of energy, students discover that energy is at the root of all change occurring in the world around them.

### Force and Motion
By demonstrating and explaining ways that forces cause actions and reactions, as well as gaining a deeper understanding of basic forces such as friction and gravity, students discover the many ways that forces affect the motion of objects around them.

### Science Skill Builders
With 21 lessons spanning the breadth and depth of science skills, students develop a core understanding of using tools in science, scientific testing, observation skills, and the importance of analysis and conclusions.

### Design Projects
The design project series was developed to support compatible modules by allowing students to design and/or build animal homes, tools, machines, and designs of their own creation. Taking between 4-6 sessions, the projects strengthen skills and ideas about choosing materials, using tools, working with the limitations of materials, solving problems, and overall project design.
<table>
<thead>
<tr>
<th>Program Features</th>
<th>FOSS</th>
<th>Science Companion</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepares students to do inquiry-based science</td>
<td></td>
<td>Lesson O introduces students to the scientific method through the “I Wonder” Circle</td>
<td></td>
</tr>
<tr>
<td>Hardback, colorful, content-rich student reference materials for upper elementary students</td>
<td></td>
<td>Student Reference Books</td>
<td></td>
</tr>
<tr>
<td>Bound student science notebooks to foster student literacy and reading skills</td>
<td>✓</td>
<td>The original Student Science Notebooks</td>
<td></td>
</tr>
<tr>
<td>Parallels in instructional design to <em>Everyday Mathematics®</em></td>
<td></td>
<td>Developed by the creators of <em>Everyday Mathematics®</em></td>
<td></td>
</tr>
<tr>
<td>Variety of assessment strategies</td>
<td>✓</td>
<td>Teacher-friendly formative and summative assessment strategies</td>
<td>✓</td>
</tr>
<tr>
<td>A variety of pilot options to fit the interests and needs of districts</td>
<td>✓</td>
<td>Several no-cost pilot options, including an innovative online pilot program</td>
<td>✓</td>
</tr>
<tr>
<td>Correlations to local and state science standards</td>
<td></td>
<td>Correlated to state standards with customized local standard correlations available upon request</td>
<td>✓</td>
</tr>
<tr>
<td>Teacher must gather minimal teacher supplied items</td>
<td>✓</td>
<td>ExploraGear and Supplemental Classroom Supplies available</td>
<td>✓</td>
</tr>
<tr>
<td>Early Childhood activity-based modules available</td>
<td>(K Only)</td>
<td>Modules developed specifically for PreK-K available</td>
<td></td>
</tr>
<tr>
<td>Unique content offered to meet standards</td>
<td></td>
<td>Light and Rainbows, Color, and Light modules available</td>
<td></td>
</tr>
<tr>
<td>Children develop science habits of mind in addition to content knowledge</td>
<td>✓</td>
<td>“I Wonder” Circle integrates modules as tool for student reflection</td>
<td>✓</td>
</tr>
<tr>
<td>Engaging activities nourish children’s curiosity</td>
<td>✓</td>
<td>Engaging, hands-on activities focused on Big Ideas</td>
<td>✓</td>
</tr>
<tr>
<td>Supports teachers in reaching Big Ideas</td>
<td>✓</td>
<td>Reflective Discussions help children integrate their experience and build science knowledge</td>
<td></td>
</tr>
<tr>
<td>Full curriculum available digitally</td>
<td>✓</td>
<td>Hyperlinked teacher materials (iTLM’s) &amp; digital student materials build affordable access</td>
<td></td>
</tr>
</tbody>
</table>

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