

KEY CONCEPTS (SOS ENDANGERED EARTH)

- Animals rely on their sense of smell to communicate and search for food.
- Animals need to take in water and food to survive. When their natural food and water sources become scarce or threatened, they often engage in roving, or wandering outside of their habitats in search of food or water.
- Benefits and drawbacks of solutions must be considered to effectively and fairly treat everyone involved, including animals.
- Bats use a special sound wave called echolocation to find food and navigate through the dark.
- Indiana Bats are an endangered species and must be protected to avoid extinction.
- New inventions are needed to protect endangered bats.
- Many different kinds of animals often face natural and manmade obstacles such as roads, mountains, rivers and fences when roaming.
- Changes to an animal's environment or habitat (such as increased road construction and land development) can affect its ability to survive.
- There are many different methods and tools used to clean up oil spills. Each method has its advantages and disadvantages.
- The addition of a foreign substance into the environment can affect the survival of individual organisms and entire species.
- People, alone or in teams, are always inventing new ways to solve problems.
- The best zoos and wildlife centers incorporate an animal's natural habitat, likes and basic needs.
- Careful planning is an important part of any design process. Making sketches and building models are two ways to launch a new design.
- In addition to providing the best possible habitats for endangered species at zoos and wildlife centers, there are many other ways to help protect endangered species.

OBJECTIVES

- Test their sense of smell.
- Create a bear-proof invention to help stop black bears from roving into people's backyards, campsites and state parks in search of food.
- Perform an experiment to learn about sound and echolocation.
- Create an invention to help protect the summer and winter habitats of Indiana Bats.
- Explore what it means for an Indiana Bat to be endangered.
- List possible obstacles that can impede an animal's ability to safely cross a busy highway.
- Create models of obstacles often faced by animals trying to cross busy roads.
- Explore the issue of increased land and road development on animal populations, habitats and environments.
- Create inventions to protect and help animals safely cross busy highways.
- Participate in a demonstration to clean up a simulated oil spill.
- Explore the problem of oil spills and how they affect freshwater and marine wildlife and the environment.
- Experiment with and compare/contrast different methods of cleaning up oil spills.
- Create an invention for cleaning up a simulated oil spill.
- Plan and sketch a design for a new endangered species exhibit based on an animal's habitat, environment and basic needs.
- Create a model of their exhibit.
- Discuss ways they can help protect endangered species.

COMMON CORE STATE STANDARDS FOR MATHEMATICS ALIGNED TO SOS ENDANGERED EARTH (TM) K-5

COUNTING AND CARDINALITY

- K.CC1 Count to 100 by ones and by tens.
- K.CC2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
- K.CC6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

OPERATIONS AND ALGEBRAIC THINKING

- 1.OA1 Use addition and subtraction within 20 to solve word problems involving situation of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, eg., by using objects, drawings, and equations with symbol for the unknown number to represent the problem.
- 1.OA6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on: making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 + 14$): decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$): using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$): and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 13$).
- 2.OA1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- 2.OA2 Fluently add and subtract within 20 using mental strategies.

NUMBER & OPERATIONS IN BASE TEN

- K.NBT1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by drawing or equation (e.g., $18 + 10 + 8$): understand that these numbers are composed of ten ones and one two, three, four, five, six, seven, eight, ore nine ones.
- 1.NBT4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones: and sometimes it is necessary to compose a ten.
- 2.NBT5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

NUMBER & OPERATIONS-FRACTIONS

- 3.NF1 Understand a fraction $1/b$ as the quantity formed by 1 part when a whole number is partitioned into b equal parts: understand a fraction a/b as the quantity formed by a parts of size $1/b$.

MEASUREMENT & DATA

- K.MD3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
- 1.MD4 Organize, represent, and interpret data with up to three categories: ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
- 4.MD5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
 - a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $1/360$ of a circle is called a “one -degree angle,” and can be used to measure angles.

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

IN HISTORY/SOCIAL STUDIES, SCIENCE, AND TECHNICAL SUBJECTS ALIGNED TO SOS ENDANGERED EARTH (TM) K-5

WRITING STANDARDS

- Range of Writing
 1. Write routinely over extended time frames (time for research, reflections, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

SPEAKING AND LISTENING

- Comprehension and Collaboration
 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
 3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.
- Presentation of Knowledge and Ideas
 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
 5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
 6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

LANGUAGE

- Conventions of Standard English
 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- Knowledge of Language
 3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

NEXT GENERATION SCIENCE STANDARDS ALIGNED TO SOS ENDANGERED EARTH (TM) K-5

PHYSICAL SCIENCE

1-PS4 WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- 1-PS4-4. 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 MATTER AND ITS INTERACTIONS

- 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
- 2-PS1-3. 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-PS2 MOTION AND STABILITY: FORCES AND INTERACTIONS

- Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

4-PS3 ENERGY

- 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

4-PS4 WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

- 4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- 4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.

5-PS1 MATTER AND ITS INTERACTIONS

- 5-PS1-3. Make observations and measurements to identify materials based on their properties.

LIFE SCIENCE

K-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

- K.LS.1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

1-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

- 1.LS.1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

2-LS2 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

- 2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- 2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

2-LS4 BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

- 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS2 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

- 3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS3 HEREDITY: INHERITANCE AND VARIATION OF TRAITS

- 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- 3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4 BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

- 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

4-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

5-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

- 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

- 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

EARTH AND SPACE SCIENCES

K-ESS2 EARTH'S SYSTEMS

- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3 EARTH AND HUMAN ACTIVITY

- K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
- K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

2-ESS1 EARTH'S PLACE IN THE UNIVERSE

- 2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

3-ESS3 EARTH AND HUMAN ACTIVITY

- 3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

4-ESS2 EARTH'S SYSTEMS

- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS3 EARTH AND HUMAN ACTIVITY

- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

5-ESS2 EARTH'S SYSTEMS

- 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- 5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3 EARTH AND HUMAN ACTIVITY

- 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ENGINEERING DESIGN

K-2-ETS1 ENGINEERING DESIGN

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function

as needed to solve a given problem.

- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

3-5 ETS1 ENGINEERING DESIGN

- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.