teacher pre-visit packet

The Brain: A WORLD INSIDE YOUR HEAD

Exhibit Highlights

The Brain: A WORLD INSIDE YOUR HEAD is designed inspire the next generation of Montanans and neuroscientists by sharing the dynamic world inside our heads. This fascinating exhibit for all ages provides a hands-on and up-close look at the human body's most essential and fascinating organ, the brain. Through interactive exhibits and age-appropriate experiences, field trip visitors will explore the wonders of neuroscience the inner workings of the brain.

Field trip visitors will discover through the interactive exhibition, including Mind Games, an exhibit in which they can move a ball using their own brain waves. They will explore the structure and function of the different regions of the brain at the Colossal Brain and learn what happens if the brain is injured. In addition, Visual Rebound will steal the show as visitors experience first-hand the adaptability of the brain and the eye-brain connection.

These and many more engaging and educational experiences await you during the Brain: A World Inside Your Head. To bring this exhibit to your school, call Jessie Herbert at 728-STEM.

To book your field trip,
call 728-STEM.

UNIVERSITY OF MONTANA
spectrUM

questions or information? **spectrum.umt.edu • 728-STEM**

The Brain: A WORLD INSIDE YOUR HEAD

Overview of Montana OPI Content Standards and Next Generation Science Standards applied in the **Brain: A World Inside Your Head.**

OPI CONTENT STANDARDS

Science Standard 3

Students, through the inquiry process, demonstrate knowledge of characteristics, structures, and function of living things, the process and diversity of live, and how living organisms interact with each other and their environment.

Benchmark, End of Grade 4:

1. Identify that plants and animals have structures and systems that serve different functions for growth, survival, and reproduction

Science Standard 5

Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.

Benchmark, End of Grade 8:

1. Describe the specific fields of science and technology as they relate to occupations within those fields.

Benchmark, Upon Graduation:

3. Evaluate the ongoing, collaborative scientific process by gathering and critiquing information.

Career and Technical Education Standard 1

Students experience various career opportunities and assess personal career pathways.

Benchmark, End of Grade 8:

2. Explore and investigate career opportunities.

Benchmark, Grades 9-12

3. Utilize local resources to research career plans.

Next Generation Science Standards

KINDERGARTEN

Life Science 1: From Molecules to Organisms: Structures and Processes

K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

1ST GRADE

Life Science 1: From Molecules to Organisms: Structures and Processes

1-LS1-2: Read texts and use media to determine patterns of parents and offspring that help offspring survive.

Life Science 3: Heredity: Inheritance and Variations of Traits

1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

2ND GRADE

Life Science 4: Biological Evolution: Unity and Diversity

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

3RD GRADE

Life Science 1: 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.

Life Science 3: 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 variations 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.

Life Science 4: Biological Evolution: Unity and Diversity

3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

4TH GRADE

Physical Science 4: Waves and their Applications in Technologies for Information Transfer

4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

The Brain: A World Inside Your Head

Life Science 1: 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.

MIDDLE SCHOOL

Life Science 1: From Molecules to Organisms: Structures and Processes

MS-LS1-1: Conduct an investigation to provide evidence that living things are made of cells; either one or many different numbers and types of cells.

MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Life Science 3: Heredity: Inheritance and Variation of Traits

MS-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes my affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

HIGH SCHOOL

Life Science 1: From Molecules to Organisms: Structures and Processes

HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of the proteins which carry out the essential functions of life through systems of specialized cells.

Life Science 3: Heredity: Inheritance and Variation of Traits

HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Life Science 4: Biological Evolution: Unity and Diversity

HS-LS4-3: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-5: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Key Concepts Explored in *The Brain*

The brain is our most complex organ. The average brain only weighs three pounds, but it uses over 20% of your body's energy to function! It is divided into two hemispheres. The left hemisphere controls the right side of your body, and the right hemisphere controls the left side of your body. Some basic themes explored during a field trip at ***The Brain:*** *A WORLD INSIDE YOUR HEAD* include:

- Regions of the brain and their function
- Brain waves and images
- Perception and senses
- Anatomy of a neuron

Pre-Visit Discussion

We invite you to have a discussion with your class before visiting ***The Brain*** to explore what do they already know about the brain and how it works.

These topics will be explored at your field trip.

- What are the five senses? How are they perceived in the brain?
- What are the different regions of the brain? What are their functions?
- How do people in medicine diagnose brain injuries and disorders?
- How does your brain communicate with your body?

Post-Visit Discussion

After visiting The Brain, we invite you to review the pre-visit discussion items.

- What did students learn from their visit to ***The Brain:*** *A WORLD INSIDE YOUR HEAD*?
- What was their favorite part of the exhibition?
- Are they interested in pursuing a career in neuroscience or neurology?

Resources: Check out these great websites to get more information about the brain to use in your classroom!
brainconnection.positscience.com
sfn.org
faculty.washington.edu/chudler/neurok.html
dana.org/brainweek/resources/education/

UNIVERSITY OF MONTANA
spectrUM

questions or information? **spectrum.umt.edu • 728-STEM**