

The Bakken Museum

Science & Engineering Standards Addressed

The Bakken Museum **Static Electricity** workshop supports the following Minnesota Science **Standards:**

K-8

1.1.1	Students will be able to ask questions about aspects of the phenomena they observe, the conclusions they draw from their models or scientific investigations, each other's ideas, and the information they read.
1.1.2	Students will be able to ask questions about a problem to be solved so they can define constraints and specifications for possible solutions.
1.2.1	Students will be able to design and conduct investigations in the classroom, laboratory, and/or field to test students' ideas and questions, and will organize and collect data to provide evidence to support claims the students make about phenomena.
2.1.1	Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.
2.2.1	Students will be able to use mathematics to represent physical variables and their relationships; compare mathematical expressions to the real world; and engage in computational thinking as they use or develop algorithms to describe the natural or designed worlds.
3.1.1	Students will be able to develop, revise, and use models to represent the students' understanding of phenomena or systems as they develop questions, predictions and/or explanations, and communicate ideas to others.
3.2.1	Students will be able to apply scientific principles and empirical evidence (primary or secondary) to explain the causes of phenomena or identify weaknesses in explanations developed by the students or others.
3.2.2	Students will be able to use their understanding of scientific principles and the engineering design process to design solutions that meet established criteria and constraints.
4.1.1	Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counterarguments.
4.1.2	Students will be able to argue from evidence to justify the best solution to a problem or to compare and evaluate competing designs, ideas, or methods.
4.2.1	Students will be able to read and interpret multiple sources to obtain information, evaluate the merit and validity of claims and design solutions, and communicate information, ideas, and evidence in a variety of formats.

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The Bakken Museum **Static Electricity** workshop supports the following Minnesota Science **Benchmarks:**

Grade 2

- 2P.1.1.1** Ask questions about an object's motion based on observation that can be answered by an investigation.
- 2P.2.2.1.1** Identify and predict quantitative patterns of the effects of balanced and unbalanced forces on the motion of an object.
- 2E.2.1.1.2** Test an object designed to reduce the impact of weather-related hazards and compare the strengths and weaknesses of how each performs.

Grade 4

- 4P.1.1.1.1** Ask questions to determine cause and effect relationships of electric and magnetic interactions between two objects not in contact with each other.

Grade 5

- 5P.1.2.1.2** Evaluate appropriate methods and tools to identify materials based on their properties prior to investigation.
- 5P.3.1.1.1** Develop and refine a model to describe that matter is made of particles too small to be seen.

Middle School (Grade 6 - 8)

- 8P.1.1.1.2** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
- 8P.1.2.1.3** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
- 8P.3.1.1.3** Develop and revise a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

High School (Grades 9-12)

- 9P.2.2.1.2** Apply Coulomb's Law to describe and predict the electrostatic forces between objects.
- 9P.3.1.1.2** Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between the two objects and the changes in energy of the two objects due to the interaction and describe how these forces are present in phenomena.