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Erosion: wins races by a landslide

Maggie H. Allocco
The College at Brockport, mallo1@u.brockport.edu

Katrijn Moulin
The College at Brockport, kmoulin21@gmail.com

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Erosion lesson plan

Standard 1- Analysis, Inquiry and Design

      Mathematical Analysis-

Key Idea 1: Abstraction and symbolic representation are used to communicate mathematically. For example: • use eccentricity, rate, gradient, standard error of measurement, and density in context

Key Idea 2: Deductive and inductive reasoning are used to reach mathematical conclusions. For example: • determine the relationships among: velocity, slope, sediment size, channel shape, and volume of a stream • understand the relationships among: the planets' distance from the Sun, gravitational force, period of revolution, and speed of revolution

Standard 2: students will access, generate, process and transfer information, using appropriate technologies

Key Idea 1: Information technology is used to retrieve, process, and communicate information as a tool to enhance learning

Key Idea 2: Knowledge of the impacts and limitations of information systems is essential to its effective and ethical use.

Standard 6: interconnectedness: common themes-

      Models-

Key Idea 2: Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.

Standard 7: Interdisciplinary problem solving

      Connections-

Key Idea 1: The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.

Standard 4:

Key Idea 2: Many of the phenomena that we observe on Earth involve interactions among components of air, water and land

Major Understandings

2.1t Natural agents of erosion, generally driven by gravity, remove, transport, and deposit weathered rock particles. Each agent of erosion produces distinctive changes in the material that it transports and creates characteristic surface features and landscapes. In certain erosional situations, loss of property, personal injury, and loss of life can be reduced by effective emergency preparedness.

2.1u The natural agents of erosion include:
• Streams (running water): Gradient, discharge, and channel shape influence a stream's velocity and the erosion and deposition of sediments. Sediments transported by streams tend to become rounded as a result of abrasion. Stream features include V-shaped valleys, deltas, flood plains, and meanders. A watershed is the area drained by a stream and its tributaries.
• Glaciers (moving ice): Glacial erosional processes include the formation of U-shaped valleys, parallel scratches, and grooves in bedrock. Glacial features include moraines, drumlins, kettle lakes, finger lakes, and outwash plains.
• Wave Action: Erosion and deposition cause changes in shoreline features, including beaches, sandbars, and barrier islands. Wave action rounds sediments as a result of abrasion. Waves approaching a shoreline move sand parallel to the shore within the zone of breaking waves.
• Wind: Erosion of sediments by wind is most common in arid climates and along shorelines. Wind-generated features include dunes and sand-blasted bedrock.
• Mass Movement: Earth materials move downslope under the influence of gravity.

Mathematic Standards and Principles

A-CED.2
    Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Mathematical Principle 4
    Model with mathematics.

Learning Goals
-   Students can list the three main types of erosion and describe the processes behind erosion
-   Students can use a model to simulate real life scenarios-erosion- and make inferences based on the model outputs
-   Students can record data, create graphs and create a line of best fit (trend line)
-   Students can use their line of best fit to answer questions
-   Students can calculate rate of erosion
-   Students can describe how erosion effects the landscape, building and people

Timeline of Lesson:

Time (in minutes)	Activity
Before class (homework, or previous class work)	*Pre-lab questions:* Students will answer the pre-lab questions about erosion.
00:00 – 05:00	*Warm-Up:* The teacher will check whether or not the students completed the pre-lab assignment. The students will discuss in groups what they learned.
05:00 – 08:00	*Class Discussion:* The whole class will go over and discuss a few important questions from the pre-lab activity.
08:00 – 18:00	*Model:* The teacher will explain the model, and do a quick demonstration on how to use the model.
18:00 – 22:00	Activity: Students will spend five minutes getting familiar with the model, and trying different scenarios.
22:00 – 40:00	*Lab:* Students will complete the lab assignment and answer all questions. The teacher will be walking around and answering questions.
40:00 – 45:00	*Discussion:* Students will discuss with a partner what they learned during the lab and compare results.
45:00 – 55:00	*Wrap-up:* The teacher will discuss the conclusion of this lesson, and the take-away. Students will ask any last minute questions.
After class (homework)	*Homework:* Students will write a conclusion paper (1 page) to discuss their results and findings.