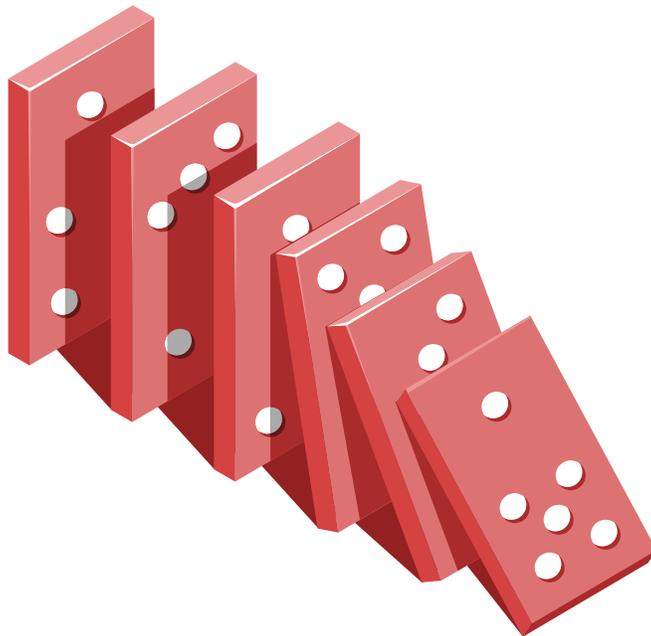




Chain Reaction Machines





Chain Reaction Machines Pre K-2 Workshop

This classic STEM workshop combines engineering and design skills with opportunities for inquiry. A great launching or culminating activity for a unit on forces.

Activity includes:

1. **Engineering Design Cycle:** Students practice the engineering design cycle through planning the solution to a problem, developing a solution, testing, and rebuilding as needed.
2. **Practice with Forces:** Students learn about forces through the chain reaction machine by developing a plan to get a marble from one point to another.
3. **Additional Challenges:** Students are given chances to test their solutions, and are given additional challenges as needed.

Supporting NGSS & Common Core Standards:

K-2-ETS1-1 Engineering Design

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 Engineering Design

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 Engineering Design

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

CCSS.ELA-LITERACY.SL.K.6

Speak audibly and express thoughts, feelings, and ideas clearly.

CCSS.MATH.CONTENT.K.CC.A.1

Count to 100 by ones and by tens.



Chain Reaction Machines 3-5 Workshop

This classic STEM workshop combines engineering and design skills with opportunities for inquiry. A great launching or culminating activity for a unit on forces.

Activity includes:

1. **Engineering Design Cycle:** Students practice the engineering design cycle through planning the solution to a problem, developing a solution, testing, and rebuilding as needed.
2. **Practice with Forces:** Students learn about forces through the chain reaction machine by developing a plan to get a marble from one point to another with added challenges.
3. **Additional Challenges:** Students are given chances to test their solutions, and are given additional challenges as needed.

Supporting NGSS Standards:

3-5-ETS1-1 Engineering Design

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 Engineering Design

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 Engineering Design

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.



Chain Reaction Machines 6-8 Workshop

This classic STEM workshop combines engineering and design skills with opportunities for inquiry. A great launching or culminating activity for a unit on forces.

Activity includes:

- 1. Engineering Design Cycle:** Students practice the engineering design cycle through planning the solution to a problem, developing a solution, testing, and rebuilding as needed.
- 2. Practice with Forces:** Students learn about forces through the chain reaction machine by developing a plan to get a marble from one point to another with added challenges.
- 3. Additional Challenges:** Students are given chances to test their solutions, and are given additional challenges as needed.

Supporting NGSS & Common Core Standards:

MS-ETS1-1 Engineering Design

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Engineering Design

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Engineering Design

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4 Engineering Design

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.



Chain Reaction Machines 9-12 Workshop

This classic STEM workshop combines engineering and design skills with opportunities for inquiry. A great launching or culminating activity for a unit on forces.

Activity includes:

1. **Engineering Design Cycle:** Students practice the engineering design cycle through planning the solution to a problem, developing a solution, testing, and rebuilding as needed.
2. **Practice with Forces:** Students learn about forces through the chain reaction machine by developing a plan to get a marble from one point to another with added challenges.
3. **Additional Challenges:** Students are given chances to test their solutions, and are given additional challenges as needed.

Supporting NGSS & Common Core Standards:

HS-PS2-1 Motion and Stability: Forces and Interactions

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

HS-PS2-3 Motion and Stability: Forces and Interactions

Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*