

# Chain Reactions

## WORKING WITH YOUTH

**Making Chain Reactions** is a fun activity that can be experienced by learners both young and old and that brings out the inner inventor in everyone. When youth build chain reaction machines they tinker with and explore materials that inspires their natural inclination to learn. How we, as parents, mentors and teachers, present materials and situational challenges can both encourage creative exploration and promote the development of STEM concepts. There are many inspiring chain reaction videos and resources online. Watch some chain reaction videos like “Josephs Machines”, “OK Go”, “The Lemonade Machine”, etc. Search YouTube.com with terms like “Chain Reaction” or “Rube Goldberg Machine”.

### Start Building Chain Reactions

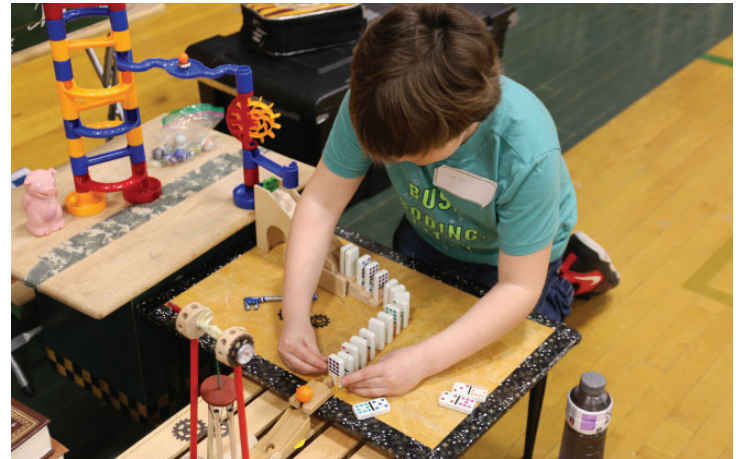
Viewing some of the many chain reaction videos online should help you to get a sense of the basic activity and the materials needed. But be sure to think about your kids and their needs, use the ideas on this page to help plan how to conduct this activity with your kids. Consider things like:

- Age and attention span of your kids
- Size of the group
- Available materials

Use the basic challenge below to get started and modify the activity by limiting materials or working on a specific type of chain reaction (i.e dominoes or ramps). Remember, when designing or adapting activities keep it simple, less is more.

### A Basic Chain Reaction Challenge

Using any available materials, build a chain reaction using as many steps as you can. Start with something simple like a string of dominoes, or a ball on a ramp then work to add in fun elements, like specific toys.



### STIMULATE CREATIVITY AND FOCUS ATTENTION

Offer a starting point or challenge to help focus your learners. You might give a specific piece to use, or a theme to follow.

#### Limit materials to focus attention:

1. Start with something simple like dominoes, blocks, or books. Make them go up stairs, around curves, and slide down ramps in your design. How many creative ways can you use dominoes?
2. Build marble ramps and tracks. Roll different items down ramps. (Marbles, balls, wheels, cans, cups, fruit, etc.) Make something roll uphill.
3. If kids master dominoes and ramps, add additional elements, towers, circuits or ways to store energy.

#### Add additional challenges or end goals:

1. Make your machine go off the table, onto the floor, and back up on to the table.
2. Tell a story or follow a theme.
3. Make a pig fly.
4. Count your chickens before they hatch.
5. Include a circuit in your design.
6. Include 27 paperclips in your design.

## Chain Reaction Materials and Themes

Most chain reaction machines are made using common materials to repeat variations of common themes, based on simple machines, used in sequence. Simple machines are a group of devices that make work easier and include ramps, levers, wheel & axles, pulleys, wedges, and screws.

### Falling Blocks

Use dominos, wooden blocks, books to form a continuous “domino train” of toppling blocks. Dominoes can go up and over or under, bridges, blocks, stairs, levers, etc.

### Balls and Tracks

Use various materials to build a series of ramps or tracks for marbles, balls, or other round things to roll down. Build ramps or tracks from foam pipe insulation, pieces of cove molding, “Hot Wheels” tracks, pieces of wood or cardboard, etc.

### Towers and Structures to add height

Height is important for rolling, dropping, or swinging things to give them energy. Build simple towers and structures to add height to your chain reaction. Towers can be made from blocks, peg board and dowels, ½” pvc and a few “T’s” and elbows, corrugated cardboard and some tape or hot glue, or other things.

### Random Items

Add a collection of random items to create a fun theme or add some challenge. Look around your kitchen, workshop, or junk box. Fun items might include, plastic fruit, kitchen gadgets, stuffed animals, toys, scraps of building material.

### Transfer Energy with Moving Parts

In most cases, chain reactions transfer energy of motion, kinetic energy, from one object to another. Add motion and energy with elements that fall, tip or swing. Use levers to reach from one place to another, a string set up through a pulley attached to a falling item, a pendulum, air escaping a balloon, turn on a small motorized or wind-up toy, etc.

**Stored Energy (potential energy)** - Energy can be stored in different items and then released with a trigger.

- Winding a spring, like a mousetrap
- Stretching a rubber band
- Suspending an object on a string (pendulum)
- Balancing an object held by a wedge, removing the wedge to tip it over
- An object falling or liquid pouring from high to low

### Decoration (optional, but often desirable)

Include craft supplies for youth to personalize and decorate their chain reaction machines.

#### FOR MORE ON CHAIN REACTION MACHINES

Visit UNH Extensions 4-H Maker Pathway page Making Chain Reactions.

<https://extension.unh.edu/resource/making-chain-reactions>

#### QUESTIONS?

**Claes Thelemarck**

claes.thelemarck@unh.edu  
603-447-3834

#### AUTHOR AND COPYRIGHT

Claes Thelemarck  
M.S. Extension Field Specialist

4-H Youth Development,  
Science Literacy  
University of New Hampshire

