4-H Maker Pathway

Chain Reaction Challenge

HEY DIDDLE, DIDDLE

Hey, diddle, diddle,
The cat and the fiddle,
The cow jumped over the moon;
The little dog laughed
To see such sport,
And the dish ran away with the spoon.

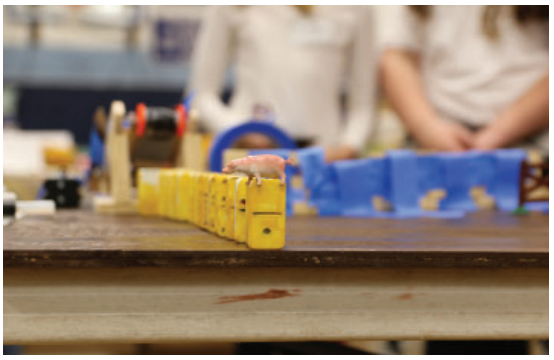
The Chain Reaction Challenge encourages creativity, design thinking, art and engineering by challenging youth to come up with complex inventions to complete a simple task. These fun inventions link together simple machines and quirky uses of common items in a chain reaction to complete a simple task. Imagine lots of levers, pulleys, rolling balls, falling dominos, etc. This is not a competitive event, but there will be prizes and incentives for teams to set and achieve challenging goals.

THE CHALLENGE – HEY DIDDLE DIDDLE

Work as a team to design and build a unique invention that completes a chain reaction of events inspired by the nursery rhyme "Hey Diddle Diddle". Have fun creating chain reactions that includes elements such as a cat playing the fiddle, a cow jumping over the moon, a laughing dog and dish running away with a spoon somewhere in the working part of the chain reaction.

CHAIN REACTION MACHINE SPECIFICATIONS

- Must complete the Challenge outlined above and should tell a story or follow a theme.
- Must complete a minimum of 5 steps, no maximum. A step is defined as a transfer of energy from one object to another. Repeating steps like cascading dominoes or marbles are considered one step.
- 16 ft2 footprint i.e., 4′ x 4′, 2′ x 8′, etc., and be no taller than 5′.
- Must be self-supporting. It may be fixed to a base and/or frame.
- May use electrical components. Only one extension cord is allowed to go to the chain reaction.
- May not use compressed air.
- May not use hazardous chemicals, flammable materials, explosives or flames.
- May use microcontrollers, but they must be triggered by a previous step. (no timers).



2023 RULES

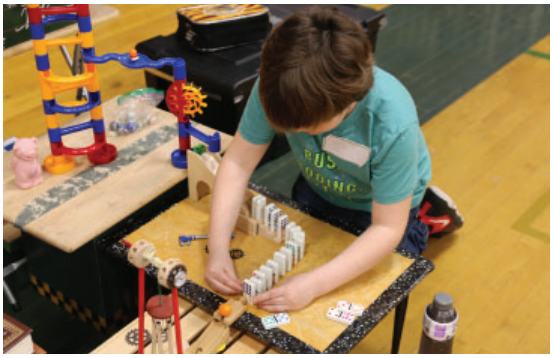
Teams

- Teams can be made up of two to eight youth ages 8 - 18 years old. 4-H Clubs, Afterschool programs, homeschool all make great teams
- Teams should keep a Chain Reaction Journal to record ideas, goals, changes, successes and failures. This can be written or digital. The Arduino Science Journal App is a great tool to record observations, notes and photos of your progress. It can be used on a smartphone, tablet or Chromebook. Journals are required for those who intend to compete at the Invention Convention or Makers Expo.
- Points are awarded for the unique number of chain reaction steps completed, goals set and achieved, or new skills or knowledge learned. (Invention Convention scoring is based on a different system.)
- New Skills – i.e. I learned to 3-D print parts for my invention.
- New Knowledge – i.e. I learned about gear ratios.

TIPS FOR GETTING STARTED:

Suggested Process:

1. Start by learning about simple machines and energy transfer.
2. The Young Inventors Program Chain Reaction Challenge has some resources to help design Chain Reactions. unh.edu/leitzel-center/teach/curricula/yip-chain-reaction-machines
3. YouTube.com is a great resource for ideas. Search terms like "Chain Reaction Machine".
4. Advisors can help with techniques and know-how.
5. Brainstorm ideas for steps, materials and how to use them.
6. Plan your chain reaction and set some goals.
7. Number of unique steps to complete the task.
8. New learning goals.
9. Gather materials and start creating.
10. Celebrate your chain reaction machine at either the Northern New England Invention Convention on Saturday, March 18 at UNH and/or the NH Farm, Forest and Garden Expo on Saturday, May 6, 2023.



SAFETY

When considering components that use electricity or any unconventional use of an item, consider its safety. Avoid high heat, rapid movement, sharp objects or other items that may cause harm or injury. All components must be deemed safe and will be checked before presentation.

Questions about safety can be directed to Claes Thelemarck at claes.thelemarck@unh.edu.

4-H MAKERS EXPO STEAMPUNK CHAIN REACTION DEMONSTRATION GUIDELINES AND SET-UP

All participants are expected to share their Chain Reactions at either the Northern New England Invention Convention on Saturday, March 18 and/or the NH Farm, Forest and Garden Expo on Saturday, May 6, 2023.

NH Farm, Forest and Garden Expo, Deerfield Fairgrounds

The 4-H Exhibit at the Expo will feature several demonstrations and competitions of STEM and other 4-H project work, including final presentations of Chain Reaction Machines. At the Expo, 4-H Chain Reaction Teams will meet with judges to present and review their machines.

Participants must be available for judging and present at least one public demonstration. Teams are encouraged to make a video of their complete chain reaction in case they cannot fully demonstrate at the Makers Expo.

Young Inventors Program and the Northern New England Invention Convention

The Young Inventors Program is a STEM based educational program the strives to develop the intellectual capacity, critical thinking, creativity and problem-solving abilities of youth through invention. They offer additional resources and activities for building chain reactions and host a separate celebration and competition every spring. Additional competition rules and chain reaction building resources can be found at unh.edu/leitzel-center/teach/curricula/yip-chain-reaction-machines.

CHAIN REACTION SCORING

The goal of the 4-H Chain Reaction Challenge is to celebrate creativity and invention. Recognition of all youth and their creativity will be showcased. Special Awards will be given to those teams that excel in meeting and surpassing the chain reaction machine requirements. Chain Reactions will be presented at the Forest and Garden Expo on Saturday, May 6, 2023.

Judging

At the Farm & Forest Expo participants will meet with judges to demonstrate their chain reactions. discuss their goals and achievements and award points. Points are awarded for each successful completion of steps and goals. The Young Inventors Program has different judging expectations.

Judges will award points for:

- Number of successful steps in your chain reaction (2 pts. Ea.)
- Named and completed learning goals (2 pts. Ea.)
- Design & build journal (10 pts.)
- General awesomeness and creativity (up to 10 points)

General awesomeness may include thoughtful reflection and analysis of successes and failures in working towards goals, a creative visual theme and storytelling, enthusiastic team spirit and/or persistence and effort in the design/build process.

Judges are STEM/STEaM professionals (Artists, Engineers, Mad Scientists, etc.) who will meet with participants to discuss their goals and achievements, certify completion of task and steps and offer coaching for future inventions. They are the Jedi of Chain Reactions. Think of them as part friend, part teacher, part referee, part Yoda.

SHOW OFF YOUR CHAIN REACTIONS!

Chain Reaction Machines can be showcased at the Northern New England Invention Convention on Saturday, March 18 at UNH and/or the NH Farm, Forest and Garden Expo on Saturday, May 6, 2023.

QUESTIONS?

Questions about rules, safety or for more information can be directed to:

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

Attribution-Non-Commercial-Share-Alike 4.0 (CC BY-NC-SA)

The University of New Hampshire Cooperative Extension is an equal opportunity educator and employer. University of New Hampshire, U.S. Department of Agriculture and N.H. counties cooperating.
© 2023 University of New Hampshire

Extension