

# Questacon at HOME

## Activity sheet – Chain Reactions

# Chain Reactions

### Background

In a chain reaction, the products of the reaction perpetuate the reaction itself. In a physical chain reaction, the movement of one object causes the next object to move, and so on – just like dominoes! In this activity, we are going to arrange a series of objects so they can undergo a physical chain reaction.

### Materials

Things to line up to be knocked over. This could be;

- Dominoes, blocks or small books
- Things to roll. Such as;
  - Wheeled toys, balls or toilet rolls
- Things to add complexity. This could be;
  - Wire/pipe-cleaners, string or rubber bands
  - Pegs, skewers or household/kitchen objects
  - Weights and pulleys

### Procedure

**Practice making things fall over:** Before building a complex structure, practice with just a few simple objects. For example, you could line up a few blocks or dominoes and observe how they fall over. Figure out how far apart you should place the different objects. You should do this for each of the various components: find out how objects roll, bounce or move in general so you know what to expect when you place them into your chain.

**Creating a chain reaction:** Make sure the building surface is stable, for example, a wooden or tiled floor. It can be helpful to test the chain reaction often as you add more components. If it does not work, make small adjustments and design changes to help it work better. However, remember that the chain reaction will have to be set up again after each test!



### Safety

This activity may use lots of small parts, which can become choking and trip/slip hazards. Adult supervision is recommended for young tinkerers.



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## Tips and Tricks

- Setting up a chain reaction can be tricky, especially for younger kids. Keep an eye out and be willing to help if a young tinkerer is struggling.
- One false move can cause the chain reaction to go off! Make sure any pets, siblings or other things which could accidentally knock things over are out of the way.
- When it's time to set off the chain reaction, make sure you get a video!

## What's the Science?

Energy comes in many different forms, such as kinetic energy (the energy of moving things) and potential energy (energy stored in an object). A chain reaction is the result energy passing from one form to another.

Let's imagine a row of dominoes standing on their ends. These dominoes have gravitational potential energy because they have the potential to fall over. When you push the first domino over, the potential energy is converted to kinetic energy. As it falls and collides with the second domino, its potential energy is also converted to kinetic energy. This pattern continues along the row of dominoes.

There are other forms of energy you can use as well. Elastic potential energy is the energy stored in a rubber band as you stretch it out. When you let go, it is quickly converted to kinetic energy as the rubber band contracts back to its normal size.

## What Questions should I ask?

### If you are a facilitator:

- What other things would you like to try and add to your chain reaction?
- Why do you think this part isn't working? Do you have any ideas as to how we can fix the problem?
- Would you like some help here, or would you like to try and figure it out yourself?

### If you are the tinkerer:

- Is there a way to alter my chain reaction to fix this problem (e.g. try a different object)?
- Is there someone who I can team up with to help me solve this problem?

## What's next?:

- **Time Challenge:** How long can you make your chain reaction last?
- **Split Challenge:** Can you build a chain reaction that starts at one point, but then splits and ends in two different places? What about a reaction that starts in two different places, but meets up and finishes together?
- **Level Challenge:** Can you make a chain reaction that changes height? Maybe it could start on a table and finish on the floor.
- **Advanced Challenge:** Try making a Rube Goldberg Machine - this is a chain reaction designed to complete a simple task! Maybe it drops a tea bag into an empty cup! The possibilities are endless and totally up to your imagination!

