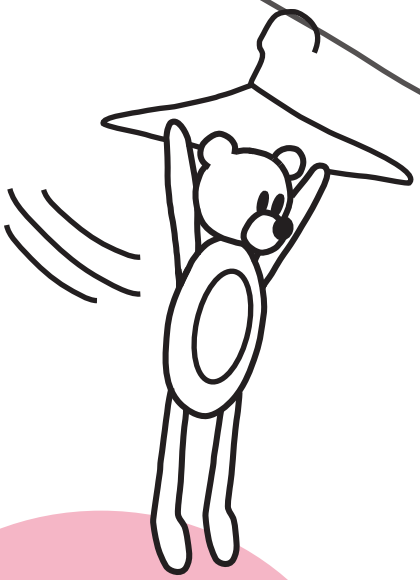
imagination box: tinkering with everyday objects

In this Tinkering with Everyday Objects Resource we will be playing with:

- Chain Reactions
- Aerodynamics
- Food colouring

We have put some items into sensory boxes that you will need and then it is up to you to find the rest around your home.

Please do make sure to share your ideas and experiments from the boxes with us! Send them to imaginationhub@ioi.london. We would love to see what you come up with!



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experimenting with chain reactions

What is a Chain Reaction?

A Chain Reaction is a sequence of little events where one object hits another object to create a reaction.

You can think of it like your morning routine. Normally, we have a series of things that we do in a particular order before we go to work or school.

We get out of bed, then go to brush our teeth, take off our PJs, have a shower, put our school clothes on, and then we eat breakfast, and so on. It is always in a particular order: one action leads to the next action. With our Chain Reaction though, if one thing doesn't happen, the next wont happen either!

What will I need?

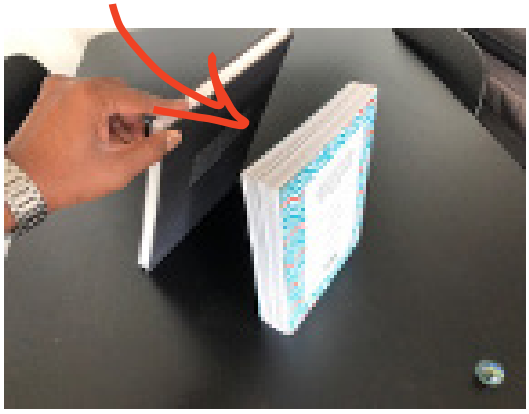
For a Chain Reaction you can use different objects you find around the house. We found that these items work really well:

- LEGO
- Dominos
- Books
- Bricks
- Cardboard
- Lollypop sticks
- Balls
- String
- Coat hangers
- Marbles
- Masking tape (to help!)

How to get started?

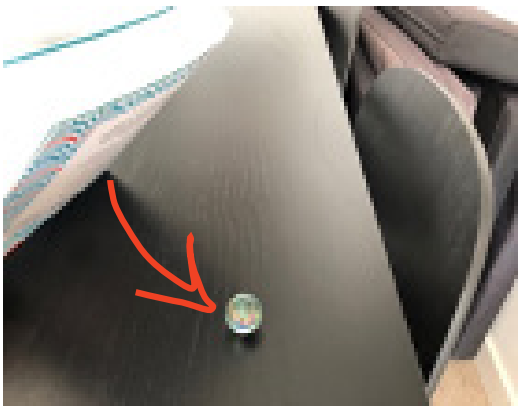
Today we are going to put lots of objects in a sequence of little events. When we do something to one of them, it is going to do something to the next.

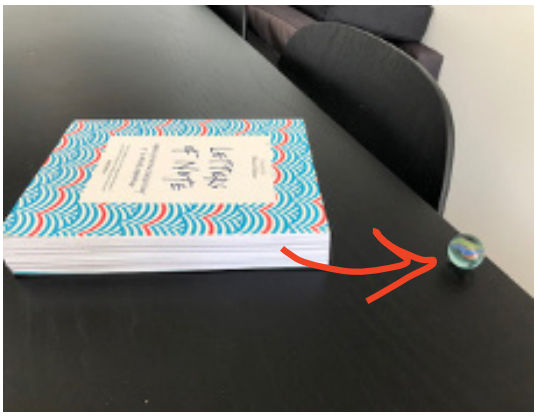
We could say that the force we show one thing is going to pass onto the next thing. Let's use two books and a marble to explain. As we push the book over, we have to use enough force to stop it standing up and to push the next book over too.



As the second book hits the marble, it has to use enough force to push the ball forward and not let it stand still, and so on.

Energy is passed on from one object to the next!



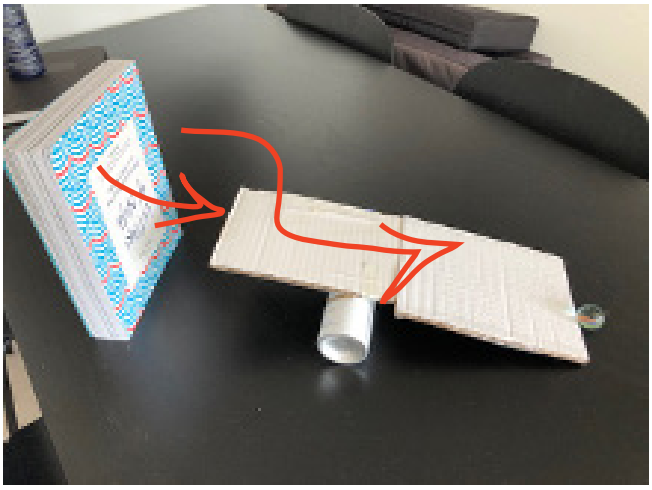


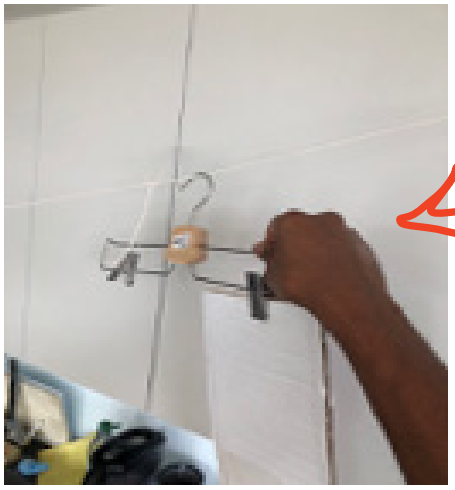
Try using objects and materials you can find around your house to make your own Chain Reaction!

Chain Reaction Top Tips

The Marble Seesaw Push

For this you need a cork (or some kind of cylinder, like a deodorant can), a ruler or long flat hard object, a book and a marble. Simply balance your ruler on the cork and get your marble ready at the end of the ruler. Push a book over onto one end of the ruler so that the marble is pushed forward by the other end.



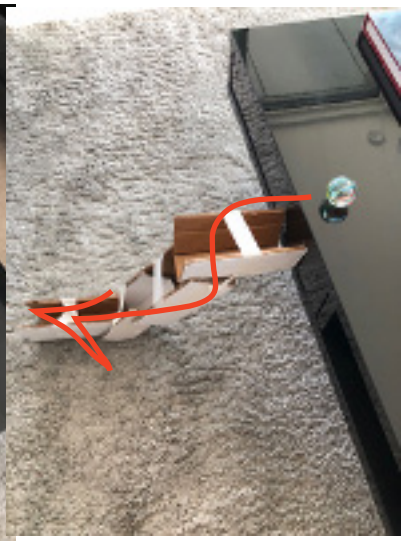


Creating a Zip Line

For this you need to tie a strong string tightly from a high point to a low point, where you have placed the next part of the chain reaction.
Simply hang something with weight off a hanger and drop it from the top of the zip line. Watch it glide down to continue the chain reaction!

Creating a Ball Slide

Take some cardboard or a paper roll and make a slide for your marble or ball to fall down from a high to a low spot. Use masking tape to make it as long or as short as you like!



Keep experimenting and testing!

See how big a chain reaction you can make. Try and use as many different types of objects as you can. Keep asking yourself questions like:

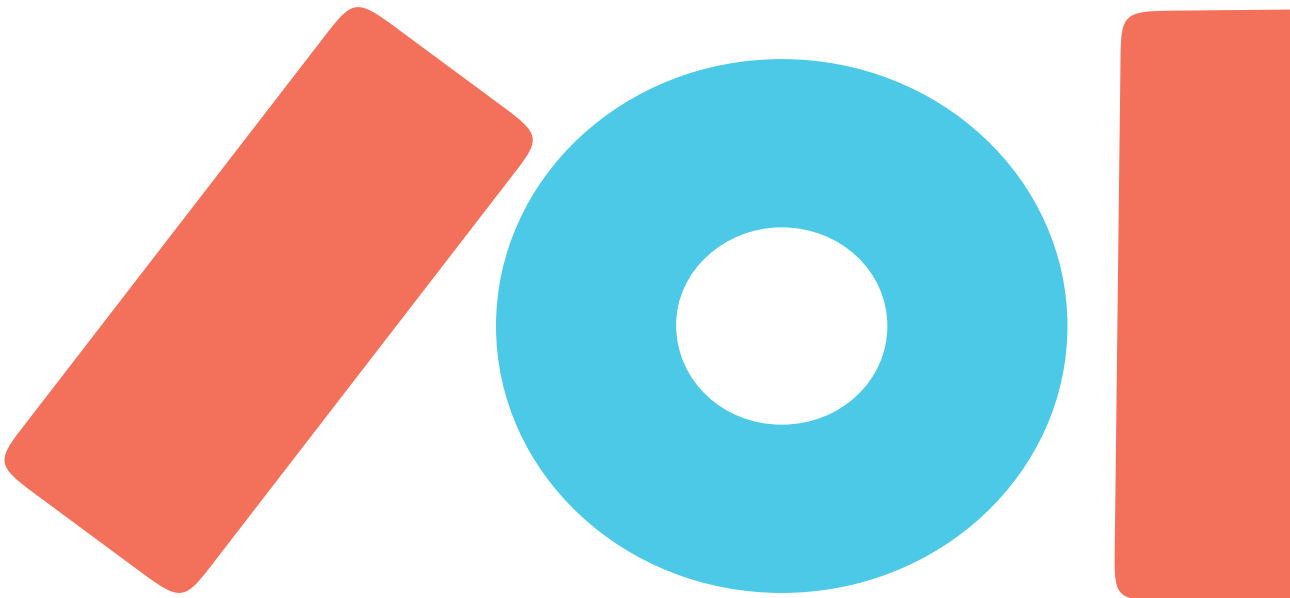
- Do heavy or light objects work best?
- Which objects stand up the easiest?
- Which things move around too much?
- Is there enough force to continue the Chain Reaction?

Don't Give Up!

It often doesn't work first time. Keep testing your Chain Reaction events until it goes right for you.

And don't be afraid to use your little finger (the magic pinkie) to keep the chain reaction going if it needs a bit of help!

We hope you enjoyed playing with chain reactions! Do make sure to share your videos of your own chain reaction with us at imaginationhub@ioi.london. We would love to see what you come up with!



experimenting with aerodynamics

Aerodynamics is all about playing with an object so that it will do what you want when it is in the air. For example, making it the right weight so it hovers or making it the right shape so it spins! If you have ever made a paper aeroplane, then you were playing with aerodynamics!

You will need:

- Cardboard box
- Cardboard envelope
- Masking Tape
- Plug point
- Hairdryer
- Wire/ String
- Four A3 cards
- Duct Tape

How to make a wind tunnel:

Step 1:

Cut a hole in one corner of the bottom of your cardboard box. Push the hairdryer through so that it sticks out of the box. Use some masking tape to keep it in place and to make sure the hairdryer sticks out as far as it can.

Step 2:

We have to make sure the hairdryer is off the table as the heat that comes out the back end could spoil your table. To do this, turn the box over and poke holes into the box with some scissors. Use tied wire to secure the hairdryer tight against the ceiling of the box. Now when you turn the box over the hairdryer is off the table!

Step 3:

Use some strong tape or duct tape to secure the hairdryer in place further. Try place it so the hairdryer blows air straight upwards.

Step 4:

Now take your cardboard envelope and cut a diamond shape into the edge. Slip the envelope over the end of the hairdryer.

Step 5:

Take your two sheets of A3 card and curve them into the envelope to make an open cone shape. Try to curve the small end of the cone so it is tight around the circle end of the hairdryer.

Step 6:

You now have your own wind tunnel! Use can now use your art materials to test and experiment with aerodynamics!

Test it out with some of these materials:

- Kebab sticks
- Sellotape
- Paper
- Pieces of light fabric
- Tissue paper
- Plastic bags
- Balloons
- Rubber gloves
- Ear buds
- Rubber bands
- Paper clips

Experiment Challenges!

- Now that you have your wind tunnel, start experimenting with your other materials to make different flying objects.
- Try to make something that shoots up high into the ceiling when you put it in the wind tunnel!
- See what you can make that will hover just above the tunnel. Can you make something that spins?
- If what you make doesn't fly, what can you do to the tunnel to make them fly better? What can you do to the flying object?
- How long you can keep them in the air? What stays in the air the longest?

Hack it!

Now let's hack this idea! That means let's try something new with it and experiment further. Here's how you make a moveable wind tunnel!

<u>Step 1:</u>
Take two more sheets of A3 card and make a new cone with them. Make it so the end of the cone fits tightly over the end of your hairdryer.

<u>Step 2:</u>
Use some duct tape to secure the cone to the hairdryer and also to make the cone stable with no flaps.

You have your move-able wind tunnel!

Test out what kind of objects you can make with this new movable wind tunnel!

How is it different now you can control the hot air? Is it easier or harder?

playing with food colouring

Why is food colouring really cool?

Food colouring gives colour to many of the things we eat. It makes it look nice to the eye and also makes it stand out, often without changing the taste. Even though we might think, say, Smarties have different flavours because they are different colours, in reality it is just food colouring and they are all exactly the same taste!

What will I need?

- Smarties
- White plate with slight rim
- Straws
- Milk
- Washing up liquid
- Cotton buds
- Empty small water bottle
- White socks
- A variety of food colouring
- Scissors
- Rubber bands
- Glycerine
- Small bowl
- Double-layer cardboard

Smarties Swirl

Step 1:
Take the plate and arrange the Smarties around the outside. Give it a pattern all of your own!

Step 2:
Then take your glass of milk and fill the centre of the Smarties circle.

Step 3:
Give it a few minutes and watch the food colouring start to swirl off the Smarties and create a design in the centre of the plate!

Step 4:
Now that you have tried it this way, try a brand new one and place the Smarties in a different pattern. Get yourself a straw and blow into the pattern after it has been created. What awesome patterns can you create?

Milk Fireworks

Using food colouring is a great way of making chemical reactions more visible and colourful. This activity creates the exciting effect creating fireworks in milk!

Step 1:
Take your clean white plate and pour a little milk into it so the whole plate is covered with milk without any spilling out.

Step 2:
Take your food colouring and put a few big droplets of different colours in the centre of the plate in the milk. Putting different colour droplets on top of each other also works well!

Step 3:
Take a cotton bud and dip one end of it in some washing up liquid. Take it to your plate and bring it straight down in the middle of the food colouring. Keep it there and watch the fireworks of colours that it creates in the milk! Move the earbud around and see more fireworks erupt. As the washing up liquid breaks down the fat in the milk it sends the different food colourings in spirals outwards!

Step. 4:
Now try blowing into the firework patterns with a straw. How does it change the patterns?

Rainbow Bubble Snakes

Let's make a rainbow bubble snake! For this you will need an small empty water bottle, a white sock you don't use anymore, some different coloured food colouring, a pair of scissors, some rubber bands, washing up liquid, some glycerine and a plate or bowl.

Step. 1:
Cut the bottle in half.

Step 2:
Take the sock and place it tight over the end. Secure the sock in place with rubber bands.

Step 3:
Take your food colouring and dot colours around the flat end of the sock.

Step 4:
Pour some washing up liquid and glycerine in a bowl and mix together.

Step 5:
Dip the flat sock end into the mix and blow into the bottle hole and hey presto! You created your Rainbow Bubble Snake!

Best to do this outside as it can get very messy!

Hack it!

We can also hack this to see what else we can do. Try the same experiment, but instead of the plastic bottle, wrap a handful of 'Bubble-Tea'-style straws together with masking tape or a rubber band. Add the sock, food colouring and dip in the glycerine mix. And blow! Does it still work as well?

Here's another hack! Let's to make a more rectangular shape to blow through like a harmonica. Find some thick double-layered cardboard. This type of cardboard has space between the two layers that you can blow through! Create a more rectangular shape by using masking tape and rubber bands. Add the sock and the rest, and blow again! How does that work out?

Try getting a big piece of paper and blowing your snake on it. When the bubbles burst and disappear what patterns are left on the paper?