Edinburgh Napier UNIVERSITY
Public Engagement with Research

In partnership with Progress through Learning Midlothian

EXPLORATHON'20
www.explorathon.co.uk/edinburgh

Midlothian

Kitchen Science Kits

We have included everything you need to take part in some fun science and art activities at home. You might need some help from an adult or someone older for some of these and there will be some videos and instructions posted online too.

You're going to learn about liquids and solids and make a cool slime that is a bit like both!

We'll have some fun with balloons learning about static and jet movement!

We make a marble maze and a catapult and learn how these toys work.

We get creative with stained glass and some butterflies.

What you'll find in your pack	Activities
• 1 tub of cornflour • Balloons • Tissue paper & Black card • Straws • Thread • Wax paper • Scissors • Glue Stick • Marbles • Lolly sticks & rubber bands • Coffee filter • Felt tip pens • Ruler • Instructions	• **Awesome Ooze** - Non Newtonian fluid experiment • **Surprising Static** – Static Electricity with balloons and tissue paper • **Wavy Water** - Using static to bend water • **Jet Power** – fire a balloon jet along a string • **Stained Glass** – for your window • **Fun with ink** - make cool patterns • **Marble Maze** – make a great puzzle • **Mini Catapult** – see how far you can reach

We'd love to see how you get on with your activities! Share them online with us during Explorathon!

@ernscot

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#EXPLORATHON20

Awesome Ooze – A Non Newtonian Fluid

You will need –

- Cornflour
- A bowl or container
- A spoon
- A cup
- This experiment can get messy so you might want to put some newspaper or a tea towel down under your bowl

1. Put newspaper or a tea towel on your table and place your empty bowl of container on top.
2. Fill a cup with cornflour and tip it into your bowl.
3. Half fill your cup with water and begin adding small amounts of water to the cornflour using your spoon to stir it in.
4. Keep adding water until the mixture feels like a liquid when you're mixing it slowly. Then try tapping on the surface with your finger or a spoon. When it is just right, it won't splash--it will feel solid. If your Ooze is too powdery, add a little more water. If it's too wet, add more cornflour.
5. It's fun to play around with the mixture and get your hands into it. Have fun trying these out
   - Pick up a handful and squeeze it.
   - Stop squeezing and it will drip through your fingers.
   - Rest your fingers on the surface of the Ooze. Let them sink down to the bottom of the bowl. Then try to pull them out fast.
   - What happens when you stir the mixture slowly?
   - What happens when you stir it quickly?
   - Can you scoop some of your mixture out and roll it into a ball?
   - What happens when you stop?
   - Put a small plastic toy on the surface. Does it stay there or does it sink?

What's Happening?

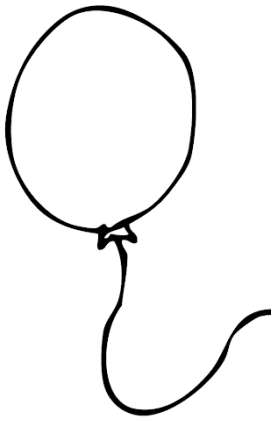
Sir Isaac Newton described Newtonian fluids in Newton's law of viscosity. He observed that Newtonian liquids have a constant viscosity/flow, and that their flow behaviour only changes when there is a change in temperature or pressure. Stress does NOT affect this type of fluid.

An example would be water. Temperature affects its viscosity. At 0˚C it turns into a solid, and at 100˚C it is a gas, but between those temperatures is behaves like a normal fluid, and has a constant viscosity. The viscosity of water is certainly not affected by applied stress.

Non-Newtonian fluids are fluids that do not follow Newton's law of viscosity. In non-Newtonian fluids, the viscosity changes when under force/stress to either more liquid or more solid.

An example would be ketchup. When you shake a bottle of ketchup, the sauce becomes more liquid. Force applied to the ketchup changes the viscosity/flow.

Surprising Static



You will need -

- Balloon
- Tissue paper
- Scissors

What to do:

1. Take your tissue paper and carefully use scissors to cut it into little shapes. These can be any shape you want….just little strips or a mix of shapes.
2. Then blow up your balloon and tie it.
3. Rub the balloon on your jumper or your hair
4. Hold the balloon near the tissue pieces – what happens?

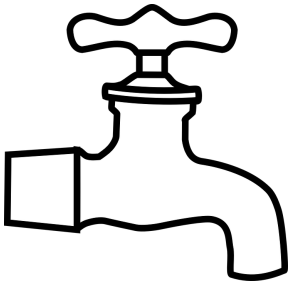
- Does it work with thicker or heaver paper pieces?
- How long do the pieces of tissues stay on the balloon – time them?
- Does it make a difference what you rub the balloon on?
- If you rub the balloon for longer does the tissue last longer?

What's Happening? Rubbing the balloon on your jumper or hair, charges it with static electricity, this attracts the tissue paper making it jump up to the balloon where it will stick until the charge wears off.

When the balloon is rubbed onto your hair or top, tiny particles pass from your hair to the balloon which cause a build up of static electricity. The static electricity pulls on the tissue paper lifting it up.

Wavy Water

What you'll need:



- An inflated balloon
- A narrow stream of water from a tap
- Dry hair

Instructions:

1. Turn on the water so it is falling from the tap in a narrow stream (just a few millimetres across but not droplets).
2. Rub the balloon back and forth against your hair for a few seconds.
3. Slowly move the balloon towards the stream of water (without touching it) while watching closely to see what happens.

What's happening?

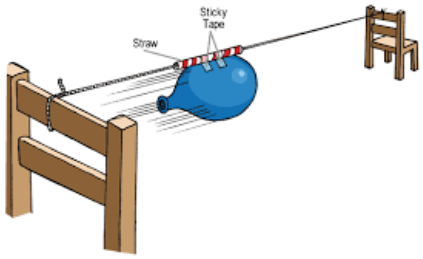
The static electricity you built on the balloon attracts the stream of water, bending it towards the balloon like magic!

Negatively charged particles called electrons jump from your hair to the balloon as they rub together, the balloon now has extra electrons and is negatively charged. The water features both positive and negatively charged particles and is neutral. Positive and negative charges are attracted to each other so when you move the negatively charged balloon towards the stream, it attracts the water's positively charged particles and the stream bends!

Jet Power

You will need

- 1 balloon
- 1 long piece of thread
- 1 straw
- Sticky tape



Instructions

1. Tie one end of the string to a chair, door knob, or other support.
2. Put the other end of the string through the straw.
3. Pull the string tight and tie it to another support in the room.
4. Blow up the balloon (but don't tie it.) Pinch the end of the balloon and tape the balloon to the straw. You're ready for launch.
5. Let go and watch the rocket fly!

What's happening? It's all about the air…and thrust. As the air rushes out of the balloon, it creates a forward motion called THRUST. Thrust is a pushing force created by energy. In this experiment, our thrust comes from the energy of the balloon forcing the air out. Different sizes and shapes of balloon will create more or less thrust. In a real rocket, thrust is created by the force of burning rocket fuel as it blasts from the rocket's engine – as the engines blast down, the rocket goes up!

Why not see what happens when

- You angle the string
- You put less air in the balloon

Stained Glass Art

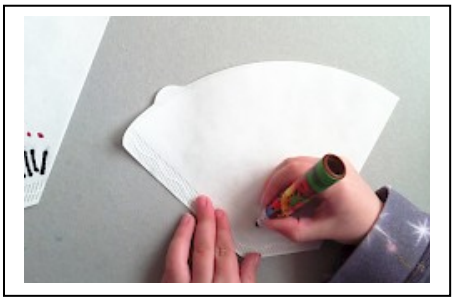
What you need

- Tissue paper
- Scissors
- Glue
- Wax paper
- Black card

What to do

1. Cut 4 strips of black card make them all the same size – this will make your frame
2. Cut up different coloured tissue paper – you could reuse some from your static experiment. Any shape will do
3. Take 1 sheet of wax paper and glue one edge and stick a strip of black card onto it.
4. Go round and glue and stick each of the black card strips down around the edge to make the frame. Don't worry if it overlaps or sticks out.
5. Trim the edges
6. Glue all over the middle of the wax paper
7. Stick the tissue paper pieces onto the wax paper – you can overlap and add extra glue to make sure everything sticks.
8. Take the 2nd sheet of wax paper and cover it in glue and stick it over the tissue paper
9. Trim around the edges and your stained glass is ready!

Fun with Ink - Coffee Filter Craft



You will need

- Coffee filter
- Felt tip pens
- Scissors
- A glass with a little water in it
- Lolly pop stick

1. Using the felt tip pens make patterns and marks at the short end of the filter paper.
2. Put the filter paper in some shallow water. Wait and watch what happens,
3. After the ink has spread take the filter paper out and put it somewhere to dry.
4. Try drawing some patterns and using different colours - what works best?
5. Cut the edges off the filter papers to open them out and make some chromatography butterflies using the lollypop sticks and your pens to decorate.

What's happening?

The ink in your pens often isn't a single colour, but is made of several colourful chemicals that we are separating out again. When the water soaks into the filter paper by **capillary action**, it **dissolves** and carries some of the ink **molecules** with it. The bigger, heavier molecules in the ink don't move as far as the smaller, lighter ones so they move with the water at different speeds and settle in different places as the water travels upwards.
You will probably find that the darker inks like black and brown work best because they tend to be made of many more colours.

This is the basis of **paper chromatography**, which is one of the most useful techniques chemists have to separate chemicals from a mixture!

Marble Maze

You will need

- Paper plate
- Straws
- Scissors
- Glue
- Marbles

1. Cut your straws into shorter pieces – a range of different sizes is good.
2. Begin thinking where you might put the different pieces.
3. Glue down your straws and decide if there is a beginning and an end to your maze.
4. Test it out with a marble.
5. Think about different designs and try those out on another plate.
6. Challenge someone else to try your maze ☺

Mini catapult

What you need

- 5 Lollypop sticks
- 3 rubber bands
- A cottonball or piece of rolled up paper
- Pens to decorate if you wish

How to do it

1. Stack 3 lolly sticks together and wrap a rubber band around each end.
2. Take 2 lolly sticks and wrap a rubber band around just one end.
3. Open the 2 lolly sticks up, like a beak and put the other bundle in so that it looks like a wonky cross
4. Now you can practice with your catapult. Push down the open end and hold on to the other using something small like paper of cotton wool! How far does it go?

What's Happening?

When you pull down on the catapult arm, elastic potential energy is stored, when you release the catapult arm the potential energy changes to kinetic energy (energy of motion) which is transferred to the object which then flies through the air.

A lolly stick catapult demonstrates energy being converted from one type to another (potential to kinetic) and transferred from one object to another (catapult arm to ball).

If you push the catapult arm down further you are storing more elastic potential energy which means more kinetic energy is transferred to the ball when you release it. The further you push the catapult arm down (which takes more force from you) the further the ball will travel.

We hope you've enjoyed these activities and would love to see your experiments and creations

Please take a moment to complete this little feedback form - you can take a photo and email it to l.kerr@napier.ac.uk

What was your favourite activity?	
How did you feel when you were doing the activities?	
What word best describes the Science at Home Pack?	
What would make the pack better?	