

# The Ultimate Summer Science Experiments

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What to do with the kids in the summer? Fun science experiments of course! The Ultimate Summer Science Experiments has everything you need! Let's get started!



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# WARNING: (legal type stuff)

### WARNING No 1:

You and your child may have the most awesome summer ever and learn loads of science too!

### WARNING No 2:

All these experiments are reasonably low risk however things can (and will) sometimes go wrong! Please follow the instructions carefully, make sure you have an adult on hand to help out and note that I or Sublime Science expressly disclaim all liability for any occurrence, including, but not limited to, damage, injury or death which might arise as consequences of the use of any experiment(s) listed or described here. Therefore, you assume all the liability and use these



science experiment projects at your own risk!

Mad Marc Says: Get a sane and sensible adult to help you - get stuck in - have a go and enjoy doing it!

# INTRODUCTION:

### What's it all about?

So many parents have asked for awesome experiments so they can keep the kids occupied, have fun and keep the learning coming over those summer months. I'm honoured to be able to share The Ultimate Summer Science Experiments with you!

### Who wrote this thing?

Hi! I'm Mad Marc (Marc Wileman on more sensible occasions!) and I founded Sublime Science to show children just how awesome science can be!

I'm best known as that guy who faced the Dragons on Dragons' Den, firing smoke rings and making slime!

I'm proud to say we've made science awesome for more than 500,000 kids and have even received the Queen's Award from Her Majesty the Queen!

- Enough about me - Let's get started!

# 1. Ultimate Egg Drop Challenge

When the sun is shining there's one

absolute classic science experiment that's guaranteed to get the children egg-cited (sorry!)... The Egg Drop Challenge.



#### What do I need:

- A plastic bag
- Some paper (scrap paper is perfect)
- Sellotape
- String
- Scissors

#### How do I do it?

STEP1 - Roll a piece of paper into a tube about the thickness of a pencil and sellotape it in place.



STEP2 - Repeat that process so you've got around 7 paper tubes.

STEP3 - Let's build our egg protection contraption! Tape your paper tubes around your egg so that it sits protected in the centre of a paper tube snowflake.



STEP4 - Connect the parachute! Thread your string through one of your best attached paper tubes and tie the ends of your string to the handles of your plastic bag.

STEP5 - Test it out! From how high can you drop your contraption without breaking your egg.



#### What's going on?

This is a brilliant way to get children thinking all about forces. When we drop our egg from a great height we've got the force of gravity pulling it down to the ground.

Our parachute is our egg's first line of defence. As our egg starts to fall the parachute fills up with air and this air resistance causes it to fall more slowly.

Finally, we've got our paper-protectors. It's the sudden impact into the ground that might cause our egg to break. The flexible paper tubes slow the egg more gently (hopefully!) stopping it from breaking.

# More Fun Please - Experiment like a real scientist!

- What difference does not using a parachute make? (You may need a spare egg or two!)
- How high can you drop your egg from and it still survive?
- Use your creativity. What designs do you have for the Ultimate Egg Drop Challenge?

## 2. Water Bomb Catapult

On a sunny day as the BBQ is cooking what could be better than firing off a Water Bomb Catapult. Oh, and we can learn a thing or two about forces while we're at it!

#### What do I need?

- 2 books
- 4 clothes pegs
- 4 elastic bands
- Spoon
- Water bomb! (or

ping pong ball or even paper, if you don't have a water bomb!)

#### How do I do it?

STEP1 - First we need to assemble the arm of our catapult. Simply wrap an elastic band around your spoon and clothes peg so they are connected.





STEP2 - Connect your clothes peg (with spoon) to your book. Use two elastic bands to really make sure that it's nice and tight. Make sure NOT to use your favourite book (even though I did!)



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WARNING: Never, never, never fire your catapult at anyone.

STEP3 - Carefully pull your water balloon down before releasing it into the air. (Do this outside!)

STEP4 - Now you've made a low-powered catapult - slide an extra clothes peg under the existing clothes peg to increase your range!

#### What's going on?

As you push down on your catapult you're storing potential energy within the springs. When you release your catapult this potential energy is transferred into the kinetic energy of the 'arm' of your catapult.

One the arm gets to the top it stops but as the water bomb is in motion is continues and so goes flying!

The reason that your catapult goes higher with more clothes pegs is that by adding clothespegs you're able to store more potential energy. There's more energy available to be transferred into kinetic energy to launch your water bomb even further.

# More Fun Please - Experiment like a real scientist!

- Test out some ideas to find the optimal (safe) ammunition for your catapult!
- What's the maximum number of clothes pegs that you can safely use?
- What's the maximum height and range you can get?

# 3. Bubble Worms

Bubbles are awesome all year round but there's something particularly awesome about bubbles on a summer's day. If you like bubbles then you'll love your Bubble Worm!

#### What do I need?

- Bowl
- Washing up liquid and water
- Food colouring
- Empty drinks bottle
- Scissors
- A dish cloth (clean!)
- Elastic band

#### How do I do it?

STEP1 - Mix 1 part washing up liquid with 4 parts water and stir gently in your bowl to make the perfect bubble mixture.



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STEP2 - Get an adult to help out with flattening out the edge of your bottle and cut round so you have a large bubble blower as shown.



STEP3 - Wrap your clean dishcloth over the edge of your bubble blower and secure it in place with an elastic band.

STEP4 - Dip your bubble blower in your bubble mixture and blow through it to make your Bubble Worm.

STEP5 - Discover how awesome your Bubble Worm is!!!



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#### What's going on?

Hope you had a blast making your Bubble Worm but how does it work?

The surface of your dish cloth is filled with small holes and each of those holes is acting as an individual bubble blower.

Each small hole is wrapping up a little bit of air in a layer of soap and combining together to make your beautiful Bubble Worm.

More Fun Please! - Experiment like a real scientist!

- Could you make a giant Bubble Worm maker?
- What would happen if you added some food colouring? (WARNING: This will get messy!)
- Does using warm water make a difference?
- What's the longest Bubble Worm you can make?

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# 4. Ice Cold Magic

When the sun is shining it feels great to pop some ice in your drink, right? Well, next time you cool a beverage take 30 seconds and try out this simple but magical experiment.

#### What do I need:

- Salt
- Ice cube
- Glass of water
- String
- Plate (optional but makes it less messy)

#### How do I do it?



STEP1 - Challenge a friend or family member and see if they can lift up an ice cube just by placing a piece of string on it?

STEP2 - Wet your string and push it onto your ice cube. Can you lift it up?



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STEP3 - No matter what they try it isn't possible to lift your ice cube up with just a piece of string. That's where the science comes in!



STEP4 - Make sure your string is wet and

place it on top of your ice cube. Then sprinkle half a tea-spoon of salt on top of your string.

STEP5 - Wait for 30 seconds...

STEP6 - Slowly and gently lift your string into the air and watch (in amazement!) as the ice cube lifts up with it.

STEP7 - Have a good think about what's going on!?!



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#### What's going on?

That certainly looked magical but there's some real science going on. It was only possible to lift up our ice cube when we added our salt. So what is it about adding the salt that made the difference?

The salt lowers the freezing point of the water and this means that the ice around the string melts. That's why in the winter we put salt on the roads, as it causes the ice to melt!

When the ice freezes over again it freezes around the string and connects our string to our ice cube. As long as we're really careful when we lift our string we should be able to "magically" lift our ice cube too!

# More Fun Please - Experiment like a real scientist!

- What type of salt works best? Does it make any difference?
- What could you use instead of string?
- What's the biggest ice cube that you can lift?

# 5. Ice Volcanoes

If the weather is getting a bit warm for you how about we cool everything down with an Ice Volcano! Oh, and learn a thing or two about chemical reactions too.

#### What do I need:

- Baking powder
- White vinegar
- Food colouring
- Bowl
- Glasses
- Plate
- Pipette (optional)

#### How do I do it?

STEP1 - Our first step is to build our Ice Volcano. Take a container of baking powder (approx 150g) and mix together with some warm water in a bow1.



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STEP2 - Keep mixing your baking powder and warm water together until most of the baking powder has dissolved.

STEP3 - Let's freeze our Ice Volcano! Gently place your bowl full of water mixed with baking powder in the freezer and leave overnight.



STEP4 - Take the Ice Volcano out of the freezer and let it warm up for 5 minutes before turning it over onto a plate.

STEP5 - Use different food colourings to colour our white vinegar.



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STEP5 - Eruption! Add the coloured vinegar to your Ice Volcano and witness the eruption!

#### What's going on?

Your Ice Volcano is a perfect example of the classic acid + base reaction. As our Ice Volcano is made from baking powder it is a base (or alkali!). The vinegar that we add is an acid.

When we mix the acid and the base (vinegar and baking powder) we get a chemical reaction. Those bubbles that you can see are bubbles of carbon dioxide.

More Fun Please - Experiment like a real scientist!

- What's the perfect quantity of baking powder to make the most active Ice Volcano?
- What could you use instead of white vinegar to trigger your volcano?
- Try using regular brown vinegar or some lemon juice on your Ice Volcano. What difference does that make?

## 6. Slimy Ice Chalk

Back in the good old days we used to draw and create with chalk. Don't seem to see it all that much nowadays but luckily it's easy to make our own!

WARNING: This experiment is a messy one!

#### What do I need:

- Cornflour
- Glass of water
- Food colouring
- Ice cube tray
- Spoon
- Pipette (optional)

#### How do I do it?

STEP1 - First up half fill your glass with cornflour.





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STEP2 - Add water a little at a time to your half glass of cornflour and keep stirring it together. Keep doing this until your cornflour just becomes liquid.



STEP3 - Carefully pour your cornflour liquid into your ice cube tray.

STEP4 - Add food colouring to your ice cubes and mix thoroughly together.

STEP5 - Freeze your slime cubes overnight.

STEP6 -Experiment and play with your Slimy Ice Chalk!



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#### What's going on?

Did you notice how when we mixed our cornflour and water together it wasn't quite a liquid or a solid? What we actually made is called a "non-Newtonian fluid". Not quite a solid or liquid, somewhere in between.

By freezing our Slimy Ice Chalk we changed the properties again and made it into a real solid and by adding food colouring we can have fun playing with our Slimy Ice Chalk.

WARNING: Slimy Ice Chalk is awesome but definitely messy.

More Fun Please - Experiment like a real scientist!

- What's the perfect mixture of cornflour to water to make the perfect Slimy Ice Chalk?
- How does making your chalk with hot or cold water change things?

## 7. Gravity Defying Drinks

Gravity Defying Drinks is one of my favourite 'magic tricks' but there's some real science in here too, just make sure you do this experiment outside!

#### What do I need:

- Some string
- Thick card
- A hole punch
- Tape
- A plastic cup

of water



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#### How do I do it?

STEP1 - Get a nice thick piece of cardboard to use as the base. This should be roughly A4 size. If you have thin card then fold it over and wrap some tape around to firm it up.

STEP2 - Make a hole in each of the four corners of your cardboard base.

STEP3 - Cut 4 pieces of string each around the same length and tie one to each hole in each corner of your cardboard base.

STEP4 - Tie the 4 pieces of string together about 10cm above the centre of your cardboard base.

STEP5 - Add one longer piece of string (about 1 meter) and tie this to the 4 connected bits of string to make a leash.

STEP6 - DO THIS OUTSIDE - Spin your contraption smoothly in a circular motion. The water stays in!



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#### What's going on?

Did you try it yet?! Awesome, right! But how does it work? As you spin your cup around you can feel in your hand that it's naturally trying to fly outwards.

Imagine if you let go of the string while your cup was spinning! Your cup would go flying off into the air. As long as you spin the cup fast enough that this outward force will be stronger than the gravity that's pulling the cup down to the Earth the water will stay in and you will stay dry!

More Fun Please - Experiment like a real scientist!

- What's the maximum length of string that you can use? [Remember to do this experiment outside!]
- How many cups of water can you balance on your cardboard base?
- How slow can you spin your magical spinning cup contraption and still stay dry?!

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## 8. Marshmallow Mayhem

In the summer time there's always marshmallows knocking about so let's put them to good use and fire them out of a mini-cannon and learn a thing or two about forces too!

#### What do I need:

- 2 plastic cups
- Balloon
- Scissors
- Marshmallows

#### How do I do it?

STEP1 - Put one cup inside the other so that your cannon body is nice and strong.

You'll need a bit of adult help as you cut through the two cups to make the body of your cannon.



STEP2 - Flatten your cups down and cut through the end of the cups, as shown.

STEP3 - Cut your balloon just at the point that it flairs out and stretch it over your cups.



STEP4 - Load your cannon by popping your marshmallow in and pull the balloon skin back and get ready to fire.

STEP5 - Make sure you're not pointing directly at anyone. Fire your cannon and enjoy the Marshmallow Mayhem!



#### What's going on?

Did you notice that you had to put in a little bit of effort when you pulled your balloon back? By putting in that effort you are added potential energy to your mini-cannon.

Feel how your balloon skin is now super-tight. That's because it has energy just stored up inside of it waiting to be released. As soon as you let go that energy swaps from being stored as potential energy in your balloon and changes into kinetic energy as your marshmallow goes flying across the room!

# More Fun Please - Experiment like a real scientist!

- Experiment with adding more or less tension to your balloon.
- Measure the maximum height that your cannon can fire. How can this be improved?
- What's the best angle to get the maximum distance when you fire your mini-cannon?
- Also experiment with safe objects to see what makes the best ammunition for your mini-cannon?

## 9. Food Colouring Flowers

Not only is this experiment super-quick and easy and super-fun but it's the perfect excuse to treat yourself to some flowers too!

#### What do I need:

- White flowers
- Food colouring
- Glass of water
- Scissors
- Pipette

(optional)

#### How do I do it?

STEP1 - First up, half fill your glass with water and add some food colouring. If you have different colours available then fill up a couple of different glasses.



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STEP2 - Get an adult to help out with the scissors and trim your flowers so they are the right length to stand nicely in your glass.



STEP3 - Submerge one white flower in each of your cups of coloured water!

STEP4 - Wait ...

STEP5 - And wait... you'll probably have to leave your flowers overnight to really see what's happening.

STEP6 - Examine your flowers and think about how that could have happened?



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#### What's going on?

The first thing is that colouring the water doesn't really change the science of what's happening here. All it does is enable us to see what's going on.

Generally plants "suck" water up through their roots and then all the way to their petals. This water then evaporates into the air. The fascinating thing about this experiment is that this process isn't really changed by cutting through the stem of the flower.

The flower still "sucks" up the water in much the same way and as we coloured the water we can see the petals change colour.

# More Fun Please - Experiment like a real scientist!

- Which colour makes the most impact? Why do you think this is?
- Does using hot or cold water make any difference?
- Which type of flowers change the most and which change fastest?

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## 10. Scientific Ice Cream

There's no doubt that one of the most awesome things about the summer is ice cream. So how about making ourselves some ice cream but instead of using

the freezer how about we use some science!

#### What do I need:

- Milkshake
- Ice cubes
- Salt
- Tea towel
- Small ziplock bag
- Large Ziplock bag

#### How do I do it?

STEP1 - Pour half of your milkshake into your small ziplock bag. (I went for chocolate!)





STEP2 - Half fill your large ziplock bag with lots of ice. I used both of my trays of ice.

STEP3 - Add about 10 tea spoons of salt to your ice in the large ziplock bag.



STEP4 - Put the small ziplock bag (with your milkshake in!) inside the large ziplock bag,

STEP5 - This will get really really cold so use your tea towel to stop your hand getting too cold.

STEP6 - Wrap the salty ice around your bag of milkshake for around 5 minutes. You just made your very own ice cream!



#### What's going on?

The secret to making ice cream from your milkshake is simply to freeze your milkshake and for that we used some science that you see every year.

Ever notice how in the winter they put salt on the roads? That's because the salt lowers the freezing point of the ice and this causes the ice to melt.

This time we used the exact same science to make our milkshake really cold. This meant that we could use science to freeze our milkshake and make our very own batch of Scientific Ice Cream!

# More Fun Please - Experiment like a real scientist!

- What's the perfect amount of salt to add to your ice cubes. Can you add too much?
- What's the best flavour of ice cream to make? Not really science but why not experiment with a few and find out!

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## Don't Let The Fun Stop!

I hope you loved the book but let's keep the fun going!

Claim your FREE digital copy of "Don't Eat Your Slime" - it's 5 star reviewed on Amazon & packed full of more awesome experiments. Grab your copy FREE at:

#### www.DontEatYourSlime.co.uk

## Kids Party Coming Up?

If your child's party is coming up and you would like to guarantee that it's unforgettable then the Sublime Science Party might be just what you're looking for!



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Don't Miss Out - Discover why even the Dragons from Dragons' Den love the Netmums Award-Winning Sublime Science Party at: www.SublimeScience.com