# Science Challenge

## Pinball machine

To investigate the effect of forces we are going to make a pinball machine. The design and level of challenge for the machine is up to you but here are instructions for a basic pinball machine.

You will need a cardboard box like a pizza box or a shoe box, some extra card, tape, a ball/marble or rolled up piece of foil and two lolly sticks or plastic spoons.

Unfold one end of the box sides to make a launch pad. Make slits in the card to fit the lolly sticks/spoons through for flippers. If you flip the stick on the outside of the box you should be able to make the part inside the box flick the ball along the box. Now you can create your obstacles, tunnels and scoring areas in your box. When you have done this make your box slope gently towards you. It should be ready to try. Test it then make adaptations to improve it. A step by step guide is included here to help you.
https://learning.sciencemuseumgroup.org.uk/wp-content/uploads/2019/02/SMG-Learning-Activities-Pinball-Power.pdf

# Technology Challenge



## Air Pressure Coin Poppers

### Materials

A small empty plastic drink bottle
A 2p coin
A small square of kitchen roll

### Instructions

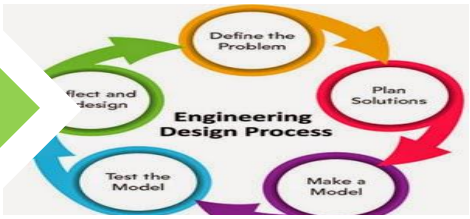
Put the empty bottle in the freezer for about an hour to cool.
Cut a small square of tissue paper and put it on top of the 2p piece.
Pour a little water over the tissue to stick it to the 2p.
Without removing the bottle from the freezer, place the 2p on top of the bottle, tissue side down, to seal as a lid. Leave for half an hour.
Bring out and warm the top of the bottle with your hands!
Watch the magic!

### WHY DOES THIS WORK?

We assume we have put an empty bottle inside the freezer but of course it is actually full of air which is a mixture of gases, containing nitrogen, oxygen and carbon dioxide amongst others. As a gas cools it shrinks lowering the *pressure*, but because the lid is off, more air can enter the bottle from the freezer. Once you placed the coin lid on, you have sealed the top. As the air inside warms up again from your hands, it expands, and forces more pressure on the inside of the bottle and the lid, compared to outside the bottle. It makes enough pressure to break the seal and pop the lid!

**https://youtu.be/U6uuoJK9PQc**

# Engineering Challenge






## European Landmarks

**Your challenge this week is to research famous European landmarks and recreate one using different materials.**

**Step 1: Research**
Find out about **different European landmarks** by completing this task;
1. **Use Google Earth** to explore and learn about some of these famous landmarks. The Eiffel tower (France); The Colosseum (Italy); Big Ben (Elizabeth Tower, UK); The Parthenon (Greece); Stonehenge (UK); La Sagrada Familia (Spain); Brandenburg Gate (Germany); the Leaning Tower of Pisa (Italy.)

2. Choose one of the landmarks which most interested you and create a **Power-point presentation**. If you have Microsoft Power-point installed on your computer desktop, you can **record yourself delivering your presentation** and talk through your slides (insert – audio – record.) You should include information about it's location; when it was built and who designed it; construction techniques; interesting features; and basic facts e.g. height, location, number of tourists who visit it every year; include reasons why tourists might want to visit this landmark and give your opinion on whether you would like to visit it and why.

**Step 2: Plan**

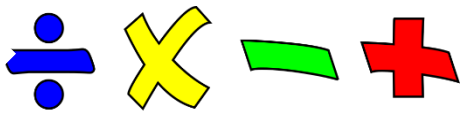
Thinking about materials you have readily available at home, plan how you will construct your model. **Draw a labelled diagram** of your plan and **justify** why your chosen materials will be suitable for your model. You can use any materials including LEGO, K'NEX, paper, cardboard, junk materials however you want to make your model as detailed and recognisable as possible so carefully consider what you use.

**Step 3: Construct, Test and Improve**
Use your plan to get started, but make changes as you test and develop your model.
Model aims;

- **Is freestanding (isn't attached to anything)**
- **Is at least 30cm tall**
- **Has detailed, recognisable features of the landmark you are recreating**
- **Can withstand high winds (use a hairdryer!)**

**Step 4: Evaluate**
Take a photo of your completed model and write a paragraph evaluating it against the aims and reflecting on what worked well, challenges you overcame and anything you would change/improve.

# Maths & Numeracy Challenge





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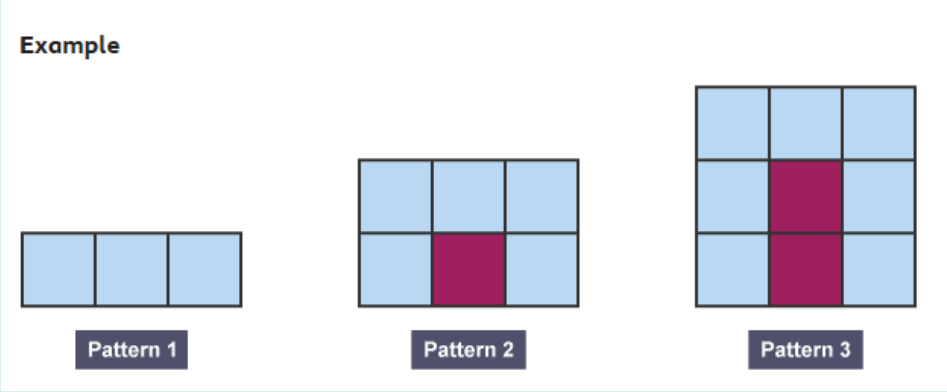
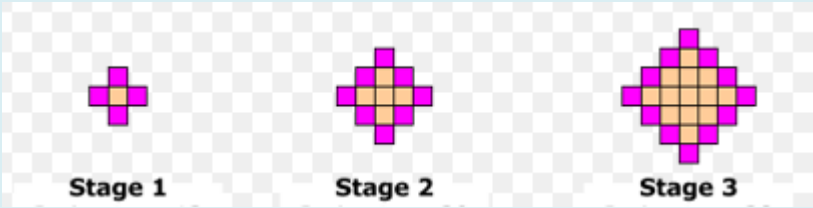
A number pattern is a list of numbers that follow a certain pattern or sequence. You usually need to find the rule to understand the pattern/sequence,
Look at this page on BBC bitesize:-

https://www.bbc.co.uk/bitesize/guides/z7j2pv4/revision/2




| | Pattern 1 | Pattern 2 | Pattern 3 | Pattern 4 | | Pattern 8 | Pattern 9 |
|---|---|---|---|---|---|---|---|
| Blue Squares | 3 | 5 | 7 | | | 17 | |
| Purple Squares | 0 | 1 | 2 | | | | 8 |
| Total Squares | 3 | 6 | 9 | | | | |

Can you complete the table above? What rule can you see for the blue squares? The purple squares? The total number of squares?




Can you make a table and explore these patterns shown above?

# Literacy Challenge



## 50 Word Story

We have all heard of Radio 2's 500 word short story writing competition and perhaps you have taken part, but have you ever tried to write a whole story in 50 words?

It is a real challenge. Each word needs to be carefully chosen to have impact and move your story along- no waffle!

You still need the story to make sense and although you could leave it with a cliff hanger it can't just be a story opening.

Here is an example called Footsteps by Sam Canning

"You imagined it," I tell myself.
But the footsteps overhead are unmistakable.
I force myself to go and check, entering the hall. Faces twist toward me, howling and horror-struck. I scream and flee but still I hear them, one rising above the rest:

"Did… did we just see a ghost?"

There are many examples here on the Scottish Book Trust website, https://www.scottishbooktrust.com/50-word-fiction

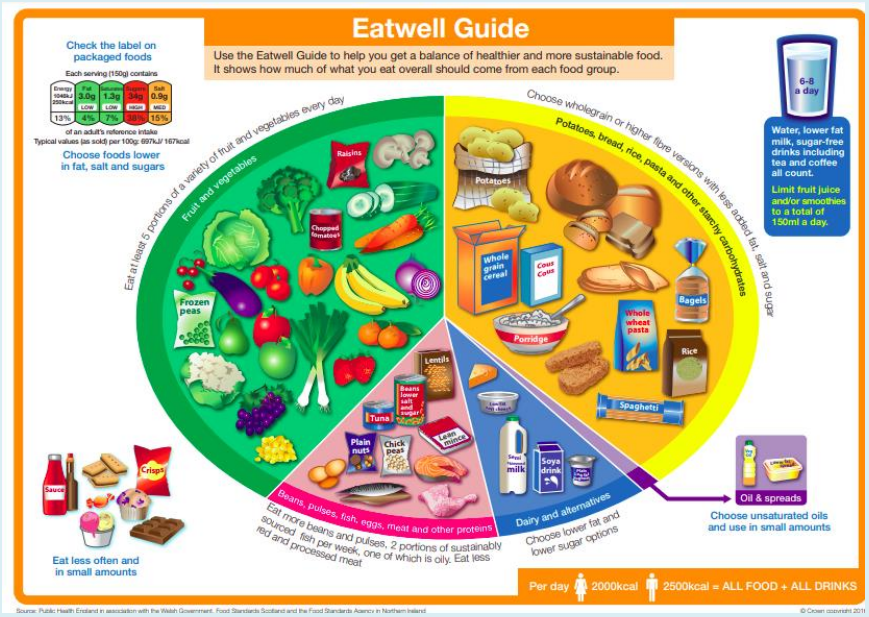
Or here-

https://fiftywordstories.com/stories/

# Health & Wellbeing Challenge

## Eatwell plate

**The eatwell plate shows us what we need to eat to be 'well' and healthy over a day. It helps us remember that we need different foods and drinks to be healthy.**




**Watch the [video on this webpage]** about the eatwell plate. Then look at **The Eatwell Guide presentation** which can be found **[via this link at the bottom of the webpage]**.

Using what you have learned, **create a poster, information guide or advert** to help explain what the eatwell guide is to teenagers. **You should include:** what the **eatwell plate** is; information about the **main areas** and **portion sizes**; and **key messages.** Make it **bright and eye-catching** and **use persuasive language** to encourage teenagers to be mindful of what they are eating and motivated to eat a healthy, balanced diet.


Have a go at **[this online game]** and see if you can correctly **sort the foods into the correct food groups.**

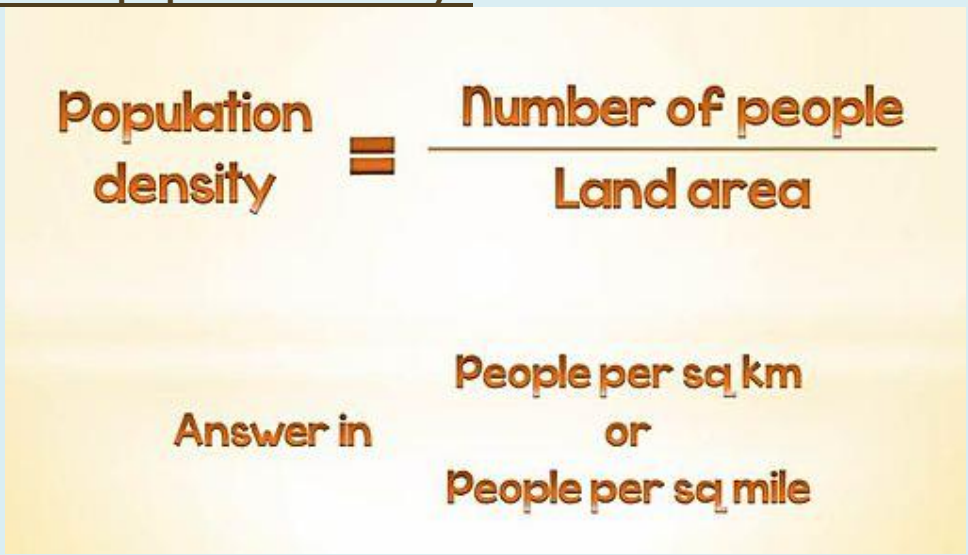
# Social Studies Challenge



## Population Density

In daily government briefings on television, politicians always discuss new figures and show graphs of how different places are being affected by coronavirus.
One of the commonly used graphs which are discussed involve population density. This is a geography term which measures how many people live within a certain area. If places are densely populated, they will have a high population density like London and if places are sparsely populated, they will have a low population density like Dumfries, Castle Douglas or Stranraer.

**How do we work out population density?**




Using the formula in the picture above, can you find the population density figures for ten different towns or cities in the United Kingdom? Once you have the answers, sort your list of locations from most densely populated to least.

Were there any surprise results?
Are there any common links between the most densely populated areas?

# Expressive Arts Challenge



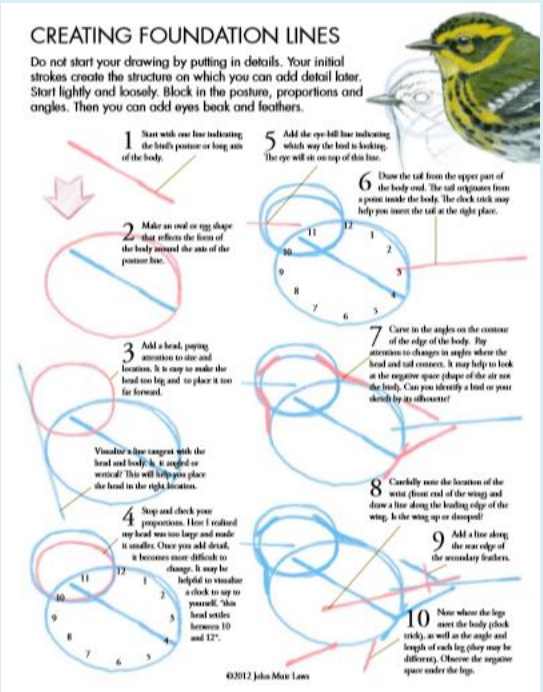
## Bird Line Drawings

I am sure during your daily exercise or out of your windows you are getting to see lots of garden birds flying about. These birds are getting ready to lay eggs or are already raising their young in nests.

Birds are fascinating creatures. Look really closely at them – some have amazing colours that you only see a flash of.

Can you draw one of the garden birds?

A great step by step guide is available to download
https://johnmuirlaws.com/wp-content/uploads/2011/06/How-to-draw-birds.pdf




Some video Tutorials can be found here:-

- https://www.youtube.com/watch?v=mYjkTDJ4OFA
- https://youtu.be/gAZ-28alj8Y