

JamboRí: Science & Tech Zone

This month's JamboRí resource will introduce you to the Science and Tech Zone! This Zone will introduce you and your patrol to some of the major impacts that Science and Technology have made on the world. There are so many to choose from that we couldn't possibly cover even a portion of them but we have picked various people & points in history that have had a major impact on our world as we know it.

In our zone, you will race to crack the enigma code, work with NASA on space exploration, discover the real Sherlock Holmes, and develop the building blocks of our computers.

Trail Blazer Introduction:

- John Tyndall (1820-1893)
- Born in Leighlinbridge, Co. Carlow
- A prominent Irish Physicist



Early Life:

His Quaker family made many sacrifices to keep him in education until he was 17 which would have been unusual for a poor family. Tyndall initially worked for the Ordnance Survey but due to his growing involvement in the labour & workers' rights movement he was dismissed. This setback proved a blessing as he moved to Germany to study for a Master's degree under Bunsen (of Bunsen burner fame!). This brought him in more academic circles and his career took off from there

Initial work:

Tyndall was initially known for his work on Diamagnetism (a quantum mechanical effect that occurs in all materials; when it is the only contribution to the magnetism the material is called diamagnetic).

Breakthrough:

Tyndall's scientific breakthrough came with a paper that identified the critical role of Greenhouse gases (GHGs) in maintaining the earth's temperature. This was hugely significant at the time and, as our understanding of climate change has improved, Tyndall's papers & experiments has been at the source of this. His work was especially important as he was able to demonstrate this phenomena as opposed to theorising.

Mountaineering:

Tyndall became part of the golden age of British mountaineering. Initially he went to the Alps for scientific research but became an enthusiastic and competent mountaineer. He was a member of the first group to climb the Weisshorn and lead one of the early summits of the Matterhorn.

Did you know?

- Tyndall Glacier in Chile and Colorado are named after John Tyndall, as is Mount Tyndall in California and Tasmania.
- Tyndall was a strong supporter of Darwin's Theory of Evolution and supported the separation of Science and Religion (against the conservative scientific ethos of the time).

Patrol Activity: The Tyndall Challenges

Introduction: We want to touch on aspects of Tyndall's life and work in a fun and challenging way that allows all members of your patrol to use their strengths to help complete the task.

Orienteering:

This challenge will start with an orienteering/navigation course to represent his outdoor work & hobbies in both ordnance survey and the mountains. The leader/other patrol need to lay a course with the caches marked on the map. If you are in an area with little outdoor space they can be exact bearings and paces to find a very small target. Each cache should be found in order and the cache can either be a part of a code word that needs to be strung together or a portion of the experiment's equipment (see below).



Equipment: Compass (per patrol), caches/code word in pieces. Map or bearings/pacing

Magnetic Slime

Tyndall's initial work was on Magnetism so we will do an experiment to create magnetic slime.

Equipment:

- 8 oz (237 ml) White school glue
- Borax (laundry section of a grocery store)
- Large mixing bowl
- 9 oz (266 ml) Plastic cup
- Measuring cups and spoons

- Zipper-lock plastic bag
- Iron filings
- Neodymium magnet
- Water
- Spoon
- Dinner plate



Photo and modified instructions from: stevespanglerscience.com/lab/experiments/magnetic-slime/

Instructions:

- Empty the entire bottle of white school glue into the large mixing bowl
- Fill the empty bottle nearly full with water, cap it, and shake it up to recover all the glue.
- Pour the water and glue solution into the bowl.
- Add a generous amount of iron filings to the water and glue mixture. Stir the new mixture thoroughly with a spoon.
- Measure a 1/2 cup (118 ml) of warm water and pour it into the plastic cup.
- Add 1 teaspoon of borax powder to the water in the cup and stir the solution. Be sure the borax dissolves completely.
- Add the borax solution to the glue solution in the bowl.
- Mix the glue and borax solutions together completely. It's a totally safe combination so use your fingers but be sure to wash your hands with soap first. There's no point loading your

new slime with dirt from your hands. It may take a few minutes to get all of it to mix but it will come together. When the chemistry has done its job, you'll be holding a large blob of a familiar looking toy. Lay the putty-like mass on the plate and flatten the goo so it has a smooth surface.

- Bring the magnet close to the surface of the flattened slime and watch the slime spring upward and grab it. The slime is stretchy but it doesn't want to move easily out of place. Use the magnet to build miniature volcanoes in the slime. If the slime is clean (because you made it with clean hands) then store it in the zipper-lock bag in the fridge. When you've made all the discoveries you want with it, you can toss it – bag and all – in the trash.