PARENT LETTER IMAGINE THAT! SPIES AND SLEUTHS

Mystery abounds as your child learns the inside outs of what happens behind the yellow crime scene tape!

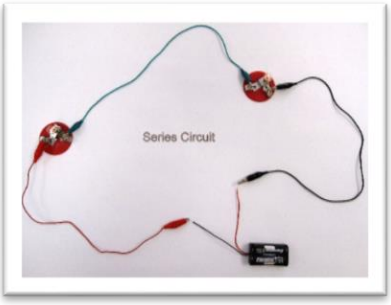
In this class we will be creating a mystery for the children to solve. Part of the camp will be learning different spy techniques and the other part will be solving a mystery.

PART 1: SPIES AND SLEUTHS TRAINING SESSION

To start class off, we introduce our story plot. We are the OXYS (Only eXcellent Youth Scientists) and we have decoded a secret message from our best spies, who are deeply infiltrated in the M.O.R.O.N.S (Magical Ogres Reshaping Our Natural Systems) organization. The M.O.R.O.N.S. work for Dr. Lipid, our arch enemy, who is always trying to harm the environment!

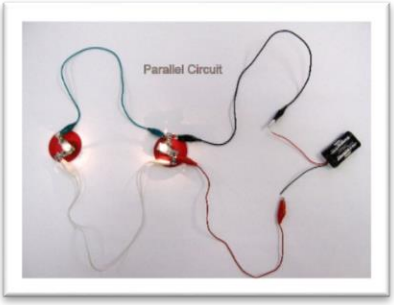
To start things off, we test the student's observations skills by having them memorize a crime scene and commit as many details to long-term memory as possible. We will continue testing and improving different abilities that are important for a spy, including balance and attention to detail.

Then the students are split into spy teams, in which they each come up with a secret identity and are given a secret spy book in which they will keep all of their secrets.



Next, we must learn several methods of security in order to protect our own secrets and also not get caught spying on another spy's secrets! (Don't worry parents, part of our OXYS Oath is to never keep secrets from our parents and we also make it very clear that spying is only OK at spy camp!)

First things first, each team will learn how to make sure no one has opened their secret spy notebook using a single hair.



Next we must secure the classroom! We start with the simple toothpick in the doorframe trick, then on to the more complicated alarm system.

First we learn about series and parallel circuits (they get to make their own!).

Ask them what the difference is! Answer:

- Series Circuits- when all components are in a single loop

- Parallel Circuits- when the circuit splits into branches

Ask them what type of circuits most Christmas lights are made of. (Answer: Parallel)

- Then we must understand the difference between insulators and conductors.
- Next, we learn about electrons, positive and negative charges, and how batteries work.

And last but not least, we build our alarm system on the classroom door!

That's it for Day 1. Do you think your child might be learning something?

DAYS 2 AND 3

Now on to even MORE exciting spy stuff!
Now that your Oxy members have learned some of the basics of being a spy, they will put what they have learned to solve our first spy mystery!

Our OXY headquarters has told us that we need to investigate a rumor that one of Dr. Lipid's minions, one of the MORONS, has infiltrated our headquarters! How do we know? We leaked some false information about where we were planning to be to a special team of OXYS called 'The Wolves,' and we sat and watched. Just as we suspected, a group of MORONS showed up exactly where we said we were going to be. We knew they were planning on spying on us!

We have to stop them now!

We have the following clues to help us find the 'mole':

1. We found fingerprints inside the room
2. When they broke into the door they left Jimmy Marks where they pried the door open.
3. We found a plastic cup with a lipstick-stained lip print on it.
4. We found a drop of blood on the floor.
5. There were 3 hairs left on the floor.
6. We also found a tread from where a jacket snagged on the door jam.
7. We found a foot print left in some powder. This powder may have been left from when the box was taken from the shelf. Hopefully the foot print is our spies!

Below is a small breakdown of a few activities your scientist will be doing to solve these clues!

FINGERPRINTS AND TRICKY TOOLS

The first clue the students will tackle is the ***fingerprints*** found inside the room. They will have to learn about the four main types of fingerprint patterns and analyze their fellow member's fingerprints. They will then learn how to ***lift prints***!

Once there done figuring out whose fingerprint was left behind – they will move on to figuring out what was used to break in! Using hammers, nails, screw drivers, and wooden planks it's up to you spy to pick out the '***Tricky Tools'*** used to break the window!

LIPSTICK AND MICROSCOPES

For the next two clues your child will need to learn about ***lip prints, how to lift a lip print, lip stick chromatography*** to find the culprit!

Next, they will tackle the blood on the floor, through the following activities:

- ***How To Use a Microscope***
  - Your student will be looking at various slides under a Compound Microscope!
- ***Blood Cells***
- ***Red Blood Cell Song***
- ***Edible Blood-Make a batch of Blood***
  - Your little scientist will be able to tell you what blood is made of, while eating a tasty treat!
- ***Blood or Not***

If there is enough time the students can make their own ***fake blood*****!**

HAIRS AND FIBERS

Your children will be ***analyzing hair samples*** under their microscopes. They must make wet mounts and dry mounts to do this.

They will also be looking at some ***fibers*** under a magnifying glass and/or a microscope – hopefully they find who left the snagged jacket from clue 7!

DAY 4: CHEMISTRY

Now the students will learn how to analyze powders and liquids found at a crime scene!

We start with a very important demonstration on lab safety. Safety first!

Then the teacher will perform two really neat science magic tricks! In the first one he/she will make water disappear from a cup! Ask your child what was secretly hidden in the bottom of the third cup. This magic trick teaches the students about absorption and osmosis.

The second science magic trick introduces the students to acids, bases, and indicators, which will make up a big part of our day. The teacher will pour clear liquids from one cup to the next and make them change colors magically… or is it just cool science!

Next the students will use vinegar (an acid) and ammonia (a base) to become familiar with the properties of acids and bases. We will use Phenolphthalein solution and Red Cabbage Juice as our indicators. Ask your child what color each of the indicators turned with the acids and bases!

- Phenolphthalein turns pink in a base and stays clear in an acid.
- Red Cabbage Juice (naturally a purple color) turns blue/green in a base and stays pink/purple in an acid.

We do several activities throughout this section involving acids and bases. These include:

- A relay race
- Making our own chemical strips (coffee filter strips dipped in turmeric solution, red cabbage juice, or Phenolphthalein solution (all indicators)) and then testing them in a variety of household liquids and drinks to see how acidic or basic they are.
- Using their knowledge to identify unknowns!

We test Baking Soda, Cornstarch, Salt, Sugar, Boric Acid, Cream of Tartar, Flour, and Unknown

We test them using:

- Physical Observation
- Reaction to Water
- Reaction to Vinegar
- Reaction to Iodine
- Microscopic View
- Flame Analysis

Everything is done by the students except for the flame analysis, which is done by the teacher as a demonstration! Here are some questions you can ask your child about the flame test:

- Q: Which powder turned the flame green?
- Q: Which powder turned the flame purple?
- Q: What happened when iron filing were sprinkled over the flame?
- Q: What was the unknown powder?

  - A: Boric Acid! The boron in boric acid turns burns green.
  - A: Cream of Tartar! The potassium antimony in cream of tartar burns purple!
  - A: They burn like sparklers! The oxygen surrounding the tiny iron filings allows them to burn.

Finally we re-enact the crime scene with interrogations of the culprits and determine who the guilty party is!

DAY 4 CONTINUED AND DAY 5: SECRET MESSAGES AND SPY TECHNIQUES

Here the students will learn spy techniques and how to write and decipher secret messages!

The first part of this section is dedicated to data dissemination and the art of secret messages.

We start off with learning about passive contact between spies via a drop location. Each spy team will come up with their own secret drop location. Ask your child where their location is and what they used to disguise the message.

Next the students use organic materials to create their own secret messages. These include vinegar, milk, liquid starch, lemon juice, and weak ammonia. Then we try 3 different methods to try to make them visible: heat, red cabbage juice (indicator), and a special materializing solution (Betadine and water). Not all of them will work! Ask your child which method worked best for the solution they tried!

The students will make rubber band messages, learn about an ancient technique used by the Spartans called scytale, and how the wood fibers in a torn piece of paper can be used to tell friend from foe. Then we will learn and practice Morse Code and create our own secret codes using shapes, letters, and numbers.

The second part of this section is focused on spy techniques and the science behind them.

Students will learn about reflection and then use that knowledge to utilize mirrors on sunglasses and our special spy scopes to see behind us and around corners!

Then we learn about sound. First we use a tuning fork and water to show the vibrations that sound makes. Then we learn about sound amplification. Here are some discovery questions we cover in class:

Discovery Question: Why do you think our ears are shaped the way they are? Do you think this helps us with hearing?

• Answer: The outside of our ear is shaped roughly like a funnel, which helps direct

Discovery Question: Does sound travels better though air or solid objects?

• Answer: Sound dissipates rapidly through air but travels well through solid objects.

Last but not least, we make our own “bugs” (or secret listening devices) and hide them around the room, and then another team comes in and does a “sweep” to find them! sounds to our ear canal and eardrum.

CRIME SCENE SCENARIO

In our Grand Finale students discover that a crime scene has occurred in their own classroom!!

They will use the skills and techniques they have learned over the week to narrow down the suspects to the final culprit.

Some of the evidence we find include fingerprints, lip prints, unknown liquids, invisible messages, hairs, footprints, and disguises! We start by taking notes about the room, making sketches, taping off the crime scene, and collecting evidence in baggies.

Then we lift the fingerprints, analyze the lip prints, open a letter without leaving any marks on the envelope, and dig through the trash!

Discovery Question: What did we use to open the sealed envelope?

Answer: We boiled water to make steam. The steam is condensed water vapor and dissolves the glue used to seal the envelope.

Next we tail our suspects in teams of two (supervise by an adult) using our spy sunglasses and spy scopes! We investigate any “suspicious” activity and narrow down our suspect list accordingly.

Eventually we narrow it down to one culprit and they confess!