Year 7 Science: Home Learning Week 9

Hello Year 7, more from the BBC Bitesize lessons this week and an optional practical to make a solar oven. As always, follow the instructions carefully, get permission from an adult before doing anything and clean up after yourself when you're finished!

Take care & stay safe

Miss Johnston ☺

Task	Description
1	Watch the BBC Bitesize lessons on Tuesday (biology), Wednesday (chemistry) and Thursday (physics). Here's a link to the daily lessons page: https://www.bbc.co.uk/bitesize/tags/zf9yy9q/year-7-lessons/1 If you have trouble watching online, you can access the Bitesize lessons via the red button on your TV remote. Just switch the TV to BBC1, press the red button and the Bitesize options should come up…
2	**Biology** a) Watch this video clip about predators, prey and their adaptions: https://www.youtube.com/watch?v=IhDS7YN_lII&vl=en-GB b) What is meant by the following terms: i. predator ii. prey iii. adaption c) Animals adapt to fit in with their environment – for example the highly camouflaged leaf gecko in the video. i. Name a predator species and describe two adaptions that help it to survive in its environment ii. Name a prey species and describe two adaptions that help it to survive in its environment
3	**Chemistry** a) Visit BBC Bitesize and read the information on filtration and evaporation (page 1 & 2): https://www.bbc.co.uk/bitesize/guides/zgvc4wx/revision/1 b) In your own words, describe how the following can be used to separate mixtures. Try to include examples of substances that could be separated using each method: i. Filtration ii. Evaporation c) Washing dries faster on a sunny and slightly breezy day than on a cool, still day. Why is this? Write a short explanation, thinking about evaporation and how the temperature / wind might affect the rate (speed) of evaporation.
4	**Physics** a) Visit BBC Bitesize, revise your knowledge and complete the quizzes on light and sound waves: https://www.bbc.co.uk/bitesize/guides/zq7thyc/revision/1 and https://www.bbc.co.uk/bitesize/guides/z8d2mp3/revision/1 b) Answer the following questions: i. Which travels faster, light or sound waves? ii. If a starting pistol is fired from the other side of the school field, will we see the smoke first or hear the bang first? iii. Why do empty rooms produce lots of echoing sounds? c) Sound cannot travel through the vacuum of outer space because there are no air or water particles for it to travel through. How do we know that light can travel through the vacuum of space? What does this tell us about how light travels?

Practical Details

Make a Solar Oven

Why do this?



There are lots of great reasons to learn how to make a solar oven! Maybe you're going camping. Maybe you're interested in learning about different ways to concentrate the sun's energy. Maybe you're interested in methods of cooking that don't add greenhouse gasses to the atmosphere. Maybe you're just hungry! In any case, as long as you're patient and willing to move your oven where the sun is, you'll be rewarded with a tasty snack.

Several scientific phenomena are involved in making your oven work. **Heat** is the form of energy (sometimes called **thermal** energy) that is transferred by a difference in temperature. You want to transfer the sun's heat to your solar over. **Reflection** is the throwing back of light, heat or sound by a body or surface, like a mirror. The shiny foil you'll use in your oven will reflect the sun's light and heat inside your oven. During **absorbtion**, energy is taken into a material rather than reflected. You will line the inside of your oven with black paper so it can absorb the light and heat being reflected into it. Another energy process you should be familiar with for this project is **convection**, which is the transfer of heat by the movement of a gas or liquid. You'll use plastic wrap to make your oven airtight so the air warmed by the sun doesn't leave your oven through convection. One final energy term important to this project is **insulation**. Insulating materials prevent heat leaving your oven through **radiation**. That's why you are going to line the inside of your oven with a cheap and effective insulator—newspaper!

Safety

- Take care when using scissors – adult supervision is required.
- DO NOT attempt to use your oven to cook meat or anything with raw egg in – it will not get hot enough to cook them properly.

Equipment & materials

- Cardboard takeaway pizza box, shoe box or large cereal box
- Pencil
- Ruler
- Scissors
- Aluminium foil
- Clear sticky tape
- Black card or paper
- Cling film
- Newspaper
- Oven gloves
- Oven proof dish or pie plate
- Cooking ingredients for s'mores: digestive biscuits, chocolate & marshmallows
- Optional: an oven thermometer to check the temperature inside your solar oven

Method

1. Clean any stray bits of cheese, sauce or crumbs out of your box.
2. Using the ruler and pencil, draw a square 2cm in from the edges of the top of the box.
3. Use the scissors to cut out three of the four sides of the square.
4. Make a crease along the uncut side of the square to create a flap that stands up.
5. Cut a piece of aluminium foil large enough to cover the inner side of the cardboard flap.
6. Wrap the foil tightly, and secure with tape.
7. Line the bottom of the pizza box with black card or paper.
8. Cut two pieces of cling film that are the same size as the top of the pizza box.
9. Roll up some newspaper pages into tubes to stuff into the sides of the box. Make sure you are still able to close the lid if you are using a pizza box.
10. Now it is time to cook something! The best time to use your oven is between 11 AM and 2 PM. Make sure to set the food on a dish so you don't mess up the interior of your oven.
11. Make your s'mores - Place one or two marshmallows on top of a digestive biscuit. Put two to three squares of chocolate on top of the marshmallow. Place them in the dish, inside your oven.
12. Use tape to secure the cling film to the inside edges of the square window you cut into the box. You are creating an airtight window.
13. Wait until the chocolate and marshallow have melted, open your oven by removing the cling film.
14. Top your s'more with a second digestive biscuit.

This example, from NASA, shows how to make the oven using a cereal box: https://climatekids.nasa.gov/smores/

Expected observations and results

On a warm sunny day, in a sheltered spot, your oven could reach around 100°C. You will notice that food takes longer to cook in a solar oven than a regular one, why is that?

Let's recap: You covered the flap with foil so that the foil would reflect sunlight into the oven. The black paper on the bottom of your oven absorbed the sun's energy (white paper would have reflected a lot of that energy). You made your oven airtight so that the warm air inside your oven would not leave the box via convection. You put the newspaper inside your oven to insulate it and prevent heat loss through radiation. It is best to use your oven between 11 AM - 2 PM because that is when the sun's rays are strongest. If you are making s'mores, it is good idea to have the chocolate on top because its dark colour will absorb heat better than the lighter biscuits. Food takes longer to cook in a solar oven because solar ovens don't get as hot as conventional ovens.

Questions and possible further investigations

- What purpose does the black paper serve? Would white paper work as well? Why or why not?
- Why do you want to make your oven airtight?
- What purpose does the newspaper serve?
- Try making melting cheese onto tortilla chips to make nachos or as a topping for baked potatoes – your oven won't get ot enough to cook your potatoes though!
- Find out how solar ovens are being distributed in areas where there is little fuel but lots of sun here: https://climatekids.nasa.gov/smores/