**BLOODHOUND SSC- LESSON IDEAS FOR KS2**

**Expansion and Contraction of Air**

The power units in BLOODHOUND SSC all use the principle of the expansion of gas when it is heated.

We can do some simple experiments in the classroom to show and understand how the expansion and contraction of air happens.

**Experiment One**

Take a glass drinks bottle and stretch the neck of a balloon across it making a seal. This works best with a balloon that has been blown up a few times. Fill a bowl with hot water and test its temperature with a thermometer. Hold the bottle in the bowl of hot water for a while and watch what happens to the balloon. It will start to inflate as the heated expanding air can only escape through the neck of the bottle and therefore into the balloon. Observe this and measure the maximum diameter of the balloon. An easy way to do this is to get a partner to hold two books against the sides of the balloon and measure the distance between them.

Then take the balloon out of the hot water and watch what happens. As the air in the bottle cools the balloon will get smaller and may even be sucked into the bottle!

Tests can be carried out using differing water temperatures and timing the expansion to maximum balloon size. Graphs can be created to work out if there is a small scientific law you can set for this bottle/balloon combination.

**Experiment Two**

It would be interesting to have half the class carry out Experiment One and the other half carry out Experiment Two.

Fill the bottle with hot water. Then fill the bowl with cold water and let both stand for one minute or so. Then empty out the hot water from the bottle but not into the bowl! Wait for 30 seconds (for the air in the bottle to warm up), then fit a balloon over the neck of the bottle and hold it in the cold water. Observe what happens. The balloon will get sucked into the bottle and may even inflate inside.

The students can write an explanation of what they have observed as they now see the effects of heat causing expansion of air and cooling causing contraction. Is there a point where the pressure in the bottle is stable?

Note for teachers:-Expansion in gases happens when they are heated at a constant pressure. If the gas is heated in the bottle, which prevents expansion, the air pressure increases. The atoms move around faster as the temperature rises thus forcing them further apart and thus the volume of gas gets larger.

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