

# Science at the Roman Baths

Bath & North East  
Somerset Council

## TEACHERS' GUIDE – CHEMICAL AND PHYSICAL CHANGES

### About the activity

This activity requires students to make simple observations at different locations in the Roman Baths sight to aid them in distinguishing between chemical and physical changes.

Physical change they will observe:

- Liquid → Gas. This will be at various different locations at the sight where steam is present.

Chemical change they will observe:

- Changes in the colouration of the water due to presence of chemical impurities in the water. It is important to note, they will not directly observe a chemical reaction – just the product of the reaction.

Students will also investigate the concept of heat transfer through the Great Bath, using their observations to explain why in regions in the Bath are warmer.

### Pre-visit suggestions

Investigating chemical and physical changes:

- Perform a lesson on the different states of matter (solid, liquid, gas) to establish the properties. Modelling out the different states using students would be a useful activity to do, so students get a grasp of the concept of density which explains why the steam rises.
- A demonstration of ice melting on a metal plate quicker than on a wooden plate is a simple way to introduce the students into heat transfer (conduction)
- For looking at heat transfer within a liquid (convection) a suitable demonstration is the heating of potassium manganate crystals in water. This shows the rise of the warmer, less dense water.

### Supporting pupils

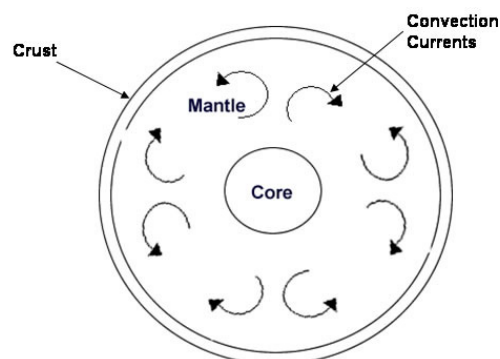
The worksheet is very self-explanatory however below is some guidance to aid pupils in their learning. We would recommend that pupils complete the activities in groups of around four, with each pupil having their own worksheet.

#### The Great Bath:

- At locations 2 and 3.
- Explanation: The water is warmest coming from the outlet which arrives from the sacred spring. Heat is lost from the locations 2 and 3 to 1 and 4.

#### The Sacred Spring:

- Explanation: the groundwater at this location is heated by convection currents in the earth's mantle.
- Diagrammatic alternative:



Spring overflow:

- There is a different chemical composition at each different water site.

Possible reasons for difference in colour:

- Concentration of minerals/ions/metal impurities/solid impurities
- Presence of microbes (bacteria/algae)

A difference in colour represents a chemical change has taken place.

- Pure water will contain the least impurities.
- The different light reading from each water indicates the concentration of impurities present.