



# The Golden Age of Islamic Science – Science Ideas Web

Age range: 5–7 years



## Basic structure of a plant and functions of parts of a plant

People in the medieval Middle East discovered that grinding the berries of the *coffea* plant and soaking them in hot water made a wonderful drink. We call this drink coffee.

🕒 Let's make our own delicious drinks. What parts of plants do we use to make drinks from? 🕒 What leaves, fruits or vegetables can we use to make our own drinks?

## Nutrition – eating the right foods

People in the Middle East grew lots of different types of food. They invented the three-course meal, with soup, a main course of meat or fish, and dessert (normally fruit and nuts).

🕒 Did people eat a healthy diet in the medieval Middle East? 🕒 Can you think of ways they could improve their diet? 🕒 Imagine you are planning a healthy three-course meal. What foods would you include and why?

## Pushes and pulls

One of the first flying machines was constructed around AD 850 by an inventor called Abbas ibn Firnas. He studied how birds flew and then constructed his own flying glider, based on the shape of bird's wings. He launched himself off a mountain and flew for nearly a minute.

🕒 Let's make our own flying machines – paper aeroplanes. Which shape of paper aeroplane flies the furthest? 🕒 What effect does adding paper clips to our paper aeroplanes have?

## Habitats and environment

Medieval Middle Eastern people used plants for many different purposes, including making clothes, medicines, cosmetics and soap. A famous Arabic scientist called Ibn Al Baytar produced an encyclopaedia of thousands of different plants.

🕒 What do we use plants for today? 🕒 Can we use a classification key to find out what plants grow in our school grounds? Let's draw a plant map of the school grounds. 🕒 Do some types of plant only grow in shady/sunny places?

## Changes in materials

Medieval Islamic scholars translated many ancient Greek and Roman texts into Arabic. They also published their own work. They needed lots of paper for their writing. Baghdad was the centre of paper manufacturing. From here it was introduced to Europe in the 13th century.

🕒 Can we find out how paper is made? 🕒 Can we make our own paper? 🕒 What ingredients will we need? 🕒 How do the ingredients change after we mix them together and leave them to dry?

## Identifying and grouping everyday materials

The medieval Middle East was famous for its elaborately decorated tents. The sultan always had his tent with him wherever he travelled. Royal tents were even called walled palaces.

🕒 Let's make our own tents. We want them to be waterproof when it rains. How can we find out which materials are waterproof? 🕒 We want them to be strong so they don't fall apart in the wind. How can we find out which materials are strong?

## Identifying and grouping everyday materials

People in the Middle East used glass to make bottles, vases, cups and windows; fabrics (eg wool and silk) to make clothes, carpets, tents, cushions, curtains, tapestries and prayer mats; metals to make cannons (bronze), coins (silver and gold) and braces for loose teeth (gold).

🕒 What examples of glass, fabrics and metals can we find in our classroom? 🕒 What are they used for?

## BIOLOGY

# THE GOLDEN AGE OF ISLAMIC SCIENCE

## CHEMISTRY

## PHYSICS

## Sounds and their sources

In the medieval Middle East the main religion was Islam. Muslims pray at certain times of day. A *muezzin* climbs to the top of a mosque to call people to prayer. The *muezzin's* call to prayer, called *adhan*, travels out across the city.

🕒 What sounds can we hear in and around our school? Let's draw a sound map of them. 🕒 Let's listen to a modern version of the *adhan*. What happens to the sound as we move further away?

## Light Sources

Many cities in the medieval Middle East had street lighting, including Cordoba, Cairo and Baghdad. People used to hang oil lamps from the sides of buildings at night time.

🕒 Where does light come from? 🕒 What light sources can you identify? 🕒 What do we use to light our streets and homes?

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Age range: 7–9 years

## Conditions for growing plants

Gardens and parks were very important in the medieval Middle East because they represented paradise on Earth. Early Arabic cities, especially Baghdad and Cordoba, were full of beautiful parks and gardens.

- 🕒 Let's create our own beautiful garden. What will our plants need to grow and thrive?
- 🕒 Does changing the amount of heat, water or light our seeds receive affect how quickly they grow?
- 🕒 Do our seeds grow more quickly in different types of soil?

## Keeping teeth healthy

People in the medieval Middle East used a basic toothbrush called a *miswak*. They also used mouthwash and understood that rotting food trapped between teeth causes tooth decay. Middle Eastern dentists were able to remove broken teeth and wire loose teeth together using gold wire.

- 🕒 Why is it important to keep our teeth healthy?
- 🕒 Can we make a poster to show how to keep our teeth healthy?
- 🕒 What can we find out about how teeth are repaired?

## Sound: pitch and volume

Music was an important part of life in the Middle East. The lute originated from there and was introduced to Europe by a musician called Ziryab.

- 🕒 Can we make our own simple string or wind instrument?
- 🕒 Can we change the sounds that our instruments make?
- 🕒 Can we make a louder or quieter sound?
- 🕒 Can we make a lower or higher pitched sound?

## Life cycles of animals and plants

Beautiful rose gardens were grown throughout the medieval Middle East. The rose was brought to Britain by knights returning from crusades. Tulips, irises and carnations also originate from the Middle East.

- 🕒 What flowers are there in our school grounds?
- 🕒 Can we use a classification key to find out?
- 🕒 Do different insects prefer different flowers?
- 🕒 Can we find out why they prefer certain flowers?
- 🕒 Can we find out why the flower is important in the life cycle of a rose?

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## PHYSICS

### Light and shadows

Large parts of the Middle East are deserts and the climate is very hot. To help people keep cool houses were built around a shady courtyard, and streets were narrow to make them shady.

- 🕒 On a hot day, where would be the best place to keep cool in the school grounds?
- 🕒 What are shadows?
- 🕒 What can we use to make shadows?
- 🕒 Do all solids make a shadow?

## Changes of state

Early Islamic chemists manufactured beautiful perfumes. A famous scholar called Al-Kindi produced a book that contained 107 perfume recipes, many of which are still used today.

- 🕒 Let's observe what happens to a perfume when we spray it onto a surface. How does it change?
- 🕒 Can you think of any other examples of this process?

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### Air resistance

The first practical windmills were invented in the medieval Middle East. They were used to grind grain, draw up water from the ground and even provide a basic system of air conditioning.

- 🕒 Does increasing the size of a windmill's blades affect how quickly they turn?
- 🕒 Does changing the angle of a windmill's blades affect how quickly they turn?
- 🕒 Can we find out what windmills are used for today?

## Comparing and grouping rocks

Islamic scholars studied the rocks around them. Al-Biruni was a mathematician and geographer who studied rocks and precious stones. He thought of a way to classify them based on their colour, shape and hardness.

- 🕒 Let's compare different rocks. We could try looking for crystals, looking through a microscope, reacting them with vinegar and testing how hard they are. How can we sort the rocks into different groups?

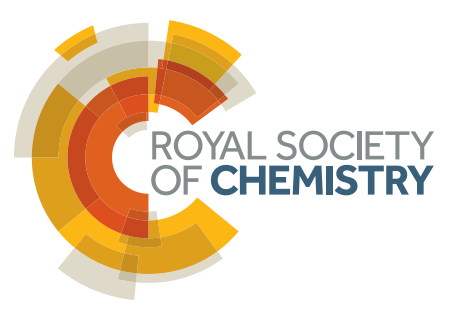
## Fossil formation

Al-Biruni was a mathematician and geographer. He suggested that parts of India had once been under the sea, because he found fossils of marine creatures in areas that were high above sea level.

- 🕒 What can we find out about fossils?
- 🕒 What can we find out about how fossils form?
- 🕒 Can we make our own 'fossils' by making an imprint of a shell and using it to cast a fossil out of plaster?



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Age range: 9–11 years

**Healthy life choices**

In the Middle East people visited bathhouses regularly. They washed themselves using soap and shampoo to keep clean.

- 🕒 Can we make a poster to show how to keep our bodies clean?
- 🕒 Soaps can kill harmful bacteria that may live on our bodies. Can we find a way to test whether washing our hands keeps them clean?
- 🕒 What difference does using hot water make?
- 🕒 What difference does using soap make?

**Human circulatory system**

Arabic doctor Al-Zahrawi created many surgical tools, such as the scalpel, and used catgut to make internal stitches in patients. Another Middle Eastern medic named Ibn Nafis described the circulation of the blood before anybody else.

- 🕒 Can we find out how and why blood circulates around our bodies?
- 🕒 Can we make a poster to explain how the heart and blood system work?

**The Earth and the moon**

People in the medieval Middle East used a lunar calendar. Many important, including Ramadan, religious festivals began when the moon was a crescent shape.

- 🕒 What changes can we see when we observe the moon for a month?
- 🕒 Can we make a model to explain why the moon appears to change shape?

**Effects of drugs**

Legend has it that coffee was invented in the 9th century by Ethiopian goat herder Kaldi. He observed that his goats became livelier after eating berries from a certain plant. He boiled some berries with sugar and water to create the world's first cup of coffee.

- 🕒 Teachers often drink lots of coffee. How can we investigate what effect coffee has on their bodies?
- 🕒 What could we observe or measure?
- 🕒 What might be the effect of drinking too much coffee?

## BIOLOGY

## PHYSICS

**Day and night, day length**

Muslims pray at different times during the day, so being able to measure time was very important in the medieval Middle East. Accurate clocks were needed to let people know when it was time to pray. Many ingenious water clocks were invented during this time.

- 🕒 Can we make our own water clock or other device to measure time?
- 🕒 Who can make the most accurate time measurer?

**Uses and properties of materials**

Washing and bathing are religious requirements for Muslims in the medieval Middle East, and keeping your body clean was important. Hard soap was created during this time. We still use the same recipe for making soap today. Soap was made on an industrial scale, especially in Nablus, Fes, Damascus and Aleppo.

- 🕒 Today we can buy many different types of soap and hand-wash. Which are the best?
- 🕒 What do we mean by 'best'?
- 🕒 What tests could we do to find out?

## CHEMISTRY

**Seeing things and light sources**

Arabic scientist Alhazen observed how light streamed through a small hole in the window shutter of his room and created an image on the opposite wall. He worked out that light travels in straight lines and discovered how we see. He also experimented with pinhole cameras.

- 🕒 Let's make our own pinhole cameras. What is unusual about the image that the pinhole camera projects?
- 🕒 What happens if we make the hole bigger, a different shape, or if we make several holes?

**Mixtures of materials: dissolving**

People in the Middle East discovered that grinding the berries of the *coffea* plant and brewing them with water made a delicious drink – coffee.

- 🕒 What happens when we put some coffee powder into water?
- 🕒 Does it make any difference if we use hot or cold water?
- 🕒 Does it make any difference if we use instant coffee or ground coffee?

**Separating mixtures**

Salt was very precious in the Middle East. One way that it was produced was by filling shallow ponds with sea water. The water evaporated, leaving the salt behind.

- 🕒 Can we separate any other dissolved solids from liquids by evaporation?
- 🕒 Does the water evaporate more quickly in a sunny or shady place?
- 🕒 Can we separate dissolved solids using a sieve?



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