

YEAR 5 UNIT 6: Super Scientist (Working Scientifically)

Enquiry Question: What impact have different scientists had on us?

Related units: Year 4 unit 6: How do you work scientifically?

Year 6 unit 6: How do you answer a scientific enquiry question accurately?

Unit overview

National Curriculum Links Year 5: Working Scientifically

Children work scientifically on a variety of quick challenges and longer tasks to learn about the different ways in which scientists work in the real world. This topic looks at the discoveries of famous scientists, the methods forensic scientists use and the various ways scientists tell others about new discoveries. It builds on the last unit in each year, whereby children build up their skill when working scientifically. They will describe what a scientist is and the different ways in which they work. They will describe the discoveries of some famous scientists. Children will carry out some forensic tests and use forensic tests to solve a crime. They will build on how to use some different types of scientific enquiry to answer questions that they learnt in Year 3. They know that there are different kinds of scientists who use different ways of work). Some children will already know that many scientists have made important discoveries.

Scientific vocabulary

- Scientist
- Timeline
- Analyse
- Pattern
- Survey
- Classify
- Fair test
- Forensic
- Fingerprint
- Chromatography
- Microscope
- DNA
- Evidence
- Debate
- Blog
- News
- Science fair

Working Scientifically

- To identify and choose good ways of letting others know about science in the news
- Discover different ways in which scientist work
- Carry out forensic tests
- Use forensic tests to solve a crime
- Plan and organise a science fair

Assessment

1. Explain why DNA analysis is such a good way of solving crimes
2. Describe 4 ways in which scientists work
3. Name 4 famous scientist and say what they are famous for
4. Explain how forensic tests help provide evidence to solve a crime

Cross-curricular links

English:

- Write a newspaper article
- Explain ideas using scientific vocabulary

Teacher knowledge

For this unit you need to become familiar with how scientists might answer questions by undertaking a fair test, carrying out a survey, classifying information scientifically and observing and looking for patterns. Ideas for the type of scientist you might consider include: astronomer (Sir Bernard Lovell); biologist (Charles Darwin); chemist (Marie Curie), geologist (Mary Anning); meteorologist (Anders Celsius); physicist (Enrico Fermi) and psychologist (Jean Piaget); tailor the scientist to the interest of your children. Children then move onto thinking about different scientists and the work they do. Having completed a number of other topics in Year 3, they may well have come across a number of famous scientists. You may wish to identify a key scientist for each of the children in the task, covering a variety of dates, ethnicities and disciplines. Accidental discoveries are an important part of science. For example, antibiotics are natural substances that are released by bacteria and fungi into their environment, as a means of inhibiting other organisms. In 1928, Sir Alexander Fleming observed that colonies of the bacterium *Staphylococcus aureus* could be destroyed by the mould *Penicillium notatum*, providing that there was an antibacterial agent there in principle. At the time, however, the importance of Fleming's discovery was not understood. Use of penicillin as a medical drug did not begin until the 1940s, when Howard Florey and Ernst Chain isolated the active ingredient and developed a powdery form of the substance. Penicillin saved many lives in World War II.

Since the early 20th Century, fingerprint detection and analysis has been the most common and important forms of crime scene forensic investigation. More crimes have been solved with fingerprint evidence than by any other method. The technique relies on the fact that every person's fingerprint is different and can be identified by comparing the three basic patterns of loops, whorl, and arch, which constitute 60-65%, 30-35% and 5% of all fingerprints respectively. Blood, footprints, hair, fibers and teeth marks can all leave behind vital clues, which can be used to identify an individual. Often it is important to have evidence from a variety of sources, which support each other to help provide conclusive evidence. Forensic scientists take great care to ensure that their evidence is not contaminated even by themselves. That is why they wear white suits and gloves and put the evidence in sealed bags when collecting the evidence from a scene. In recent years, many more sophisticated forensic methods have been devised, the most important of which is DNA profiling. Although 99.9% of human DNA sequences are the same in every person, enough of the DNA is different to distinguish one individual from another, unless they are identical twins. This technique was first reported in 1984 by Sir Alec Jeffreys at the University of Leicester and is now widely used. The power of this can be seen in the use of DNA to solve 'cold case' crimes, which have been left, unsolved for many years.

Science in the news has a high focus on literacy and there are plenty of opportunities for children to read non-fiction, write down their ideas with reasonable accuracy, spell scientific vocabulary correctly, decode new words and develop their range of writing. Children may well need help in extracting the key points from the text that you provide. Literacy tasks might focus on writing good headlines, explaining scientific ideas in plain English and writing for different audiences. The section on 'Science for all' should be considered as a starting point. You will need to think about the kinds of science fair you wish the children to put on, the time involved and do research to give more starting points.

Did you know?

- There are more scientists working now than in the rest of history put together
- The amount of scientific knowledge and inventions is now doubling every five years
- Everyone's fingerprints are different, even Siamese twins
- DNA evidence has been used to solve crimes more than 50 years old
- Often prizes in science fairs do not go to the best science, but to science that is currently fashionable

Misconceptions: Children might think that....

- Science is done by white men in white coats. In fact, scientists of both genders and all nationalities have made major contributions and they work in many different ways.
- All scientists do fair tests. There is no one scientific way and scientists use a range of methods to find out new things.
- One forensic scientist is an expert on all techniques. In fact, forensic scientists work in teams to pool their skills
- Forensic evidence is always good. In fact, evidence may be contaminated.
- All news is good news. In fact, some science news is certainly not good e.g. global warming
- Science is not fun. In fact, it can be...take part in a science fair and enjoy!

Resources

Play the game: www.glasgowsciencecentre.org/online/gsi-glasgow-science-investigation.html which will help children see how forensic scientists can collect and use evidence to solve a crime. Discuss the methods that the scientists are using.

Show children a variety of headlines from newspapers, magazines and web pages. Include some science headlines and on-science headlines.

Research on the internet – what is a science fair?

Look at: <http://thebigbangfair.co.uk> or the <https://www.youtube.com/user/GoogleScienceFair> video for inspiration

Use www.sciencebuddies.org and www.education.com/science-fair as a starting point for project ideas.