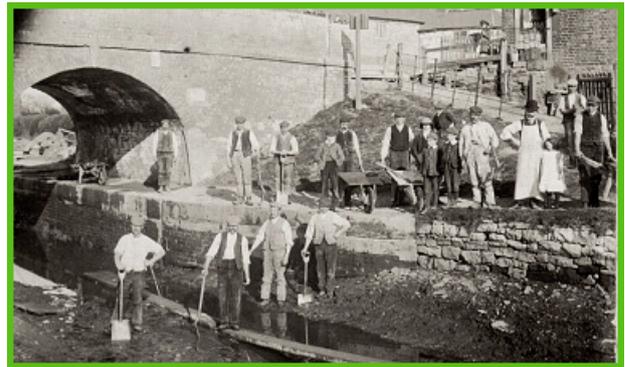


Name:

Date:

The Somerset Coal Canal was one of over one hundred canals that were built across Britain between 1750 and 1820.

Nowadays we would use powerful machinery but then, labourers built the canals by hand. They used picks and shovels. The labourers were called '**Navvies**' or '**Navigators**' because they were cutting new routes for the canals.



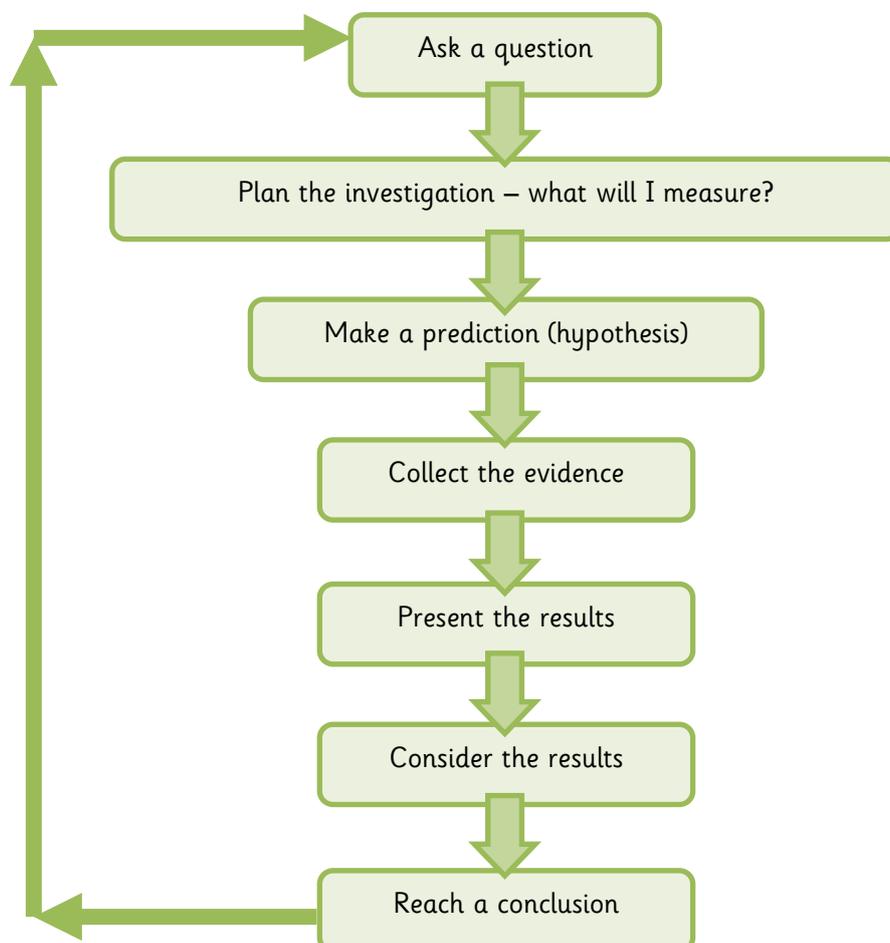
Canal navvies

After the canal channel was dug, it had to be made waterproof so that the water did not leak out. It was in a time before plastic had been invented!

Image used courtesy of the Powys Digital History Project
history.powys.org.uk/school1/transport/builders.shtml

Investigation

A scientific investigation always follows the same route:



The navvies had a choice of materials to make the canal channel waterproof:

Loose Soil	Compacted soil	Sand
Dry loose clay	Wet 'puddled' clay	Gravel

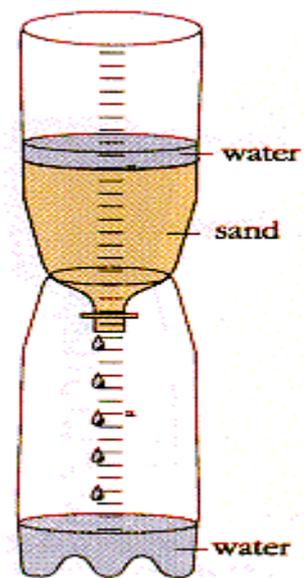
I want you to investigate the best material to stop the canal channel from leaking. You need to design a fair test, e.g.

- Should you use different amounts of water with different materials?
- Should you pour the water through the materials at different speeds?

Can you think of other variables that might affect your investigation?

Equipment

- Two plastic bottles with the bottoms cut off
- A measuring jug of water
- A measured amount of soil, sand, dry loose clay, puddled clay and gravel



Method:

1. Choose one of the materials for investigation, e.g. sand
2. Place this in the upturned plastic bottle
3. Pour a measured amount of water through the material
4. Record your observations

Results:

Draw a table of your results, e.g.

Material	Time	Observations

Conclusion:

1. How did the navvies stop the canal channel from leaking 200 years ago?
2. How might this 'waterproofing' be done differently today?

This resource is one of a group of resources for KS1,2 and 3 on the subject of the Somerset Coal Canal and coalfield.

More information from the [Somersetshire Coal Canal Society](http://www.somersetshirecoalcanal.org.uk).



Notes for teachers

This activity is designed as a useful method of introducing the concept of a scientific investigation. It allows the teacher to stress the need for a fair test in all experiments.

The topic could be introduced by asking the pupils what happens to puddles in the school grounds after rain. Do they soak away in some areas but remain in others? Alternatively, you could ask the pupils what happens after rainfall on a variety of surfaces, e.g. a sandy beach, a tarmac road, an area of parkland, a ploughed field etc. Open questioning can elicit a basic understanding of permeability.

The experiment could be used as an in-class demonstration by the teacher or with the pupils carrying out the experiment themselves. It is suggested that this is conducted in small groups of two or three.

The idea of reliability of results could be considered if the pupils are asked to repeat the experiment two or three times with a single material.

The pupils can be asked to report their results to the class and this could be displayed on an IWB.

Some pupils may find the final stage of reaching a conclusion/evaluation difficult. It is suggested that they could be steered to investing gravel or sand for example, as the results are unlikely to vary from what would be obviously expected.

Differentiation:

It is suggested that, during one of the demonstrations, you carry out the experiment unfairly and challenge the pupils to comment on the fairness of the method.

Safety:

- Care must care taken to ensure that particles of soil, sand etc. do not get into children's eyes.
- Ensure that the cut edges of the plastic bottles are not sharp.
- There is the potential for some considerable mess with this activity. It is suggested that the pupils carry out the experiment outdoors, on a sunny day.