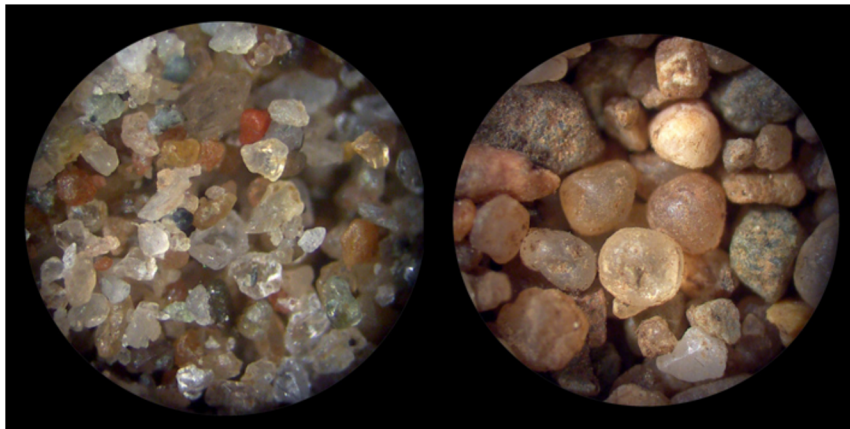


GEOLOGY AND MATERIALS

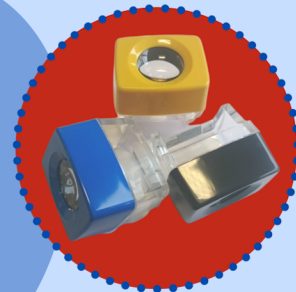
COMPARING SANDS AND GRAINS

- Collect several different samples of sand. Builder's sand, beach sand from low and high tide areas, stony beach sand, play sand....are all suitable.
- Suggest to the pupils that they are going to do a forensic examination to help catch a thief. Start with a scenario which would appeal to the class.
- For example: - A trail of sand was left by the thief near the window where a break-in took place. The sample will indicate where the culprit might work.
- The pupils should note colours, shapes, measure the sand grain sizes of the various samples and to look for pieces of shell and other materials.
- From their observations they should be able to identify which is the same as the police evidence.
- Use [Result Sheet 1](#)
- Encourage the pupils to look for shell pieces and other materials in the sand samples.



SOIL SAMPLES

- A similar investigation can be carried out using soil samples.
- Collect various soil samples. Try to include sandy, clay, compost, stony and fine top soil.
- The grains of soil will be smaller than grains of sand so measuring grain size may not be suitable. Pieces of plant and decaying matter may also be noted. This activity encourages close observation.
- Use [Result Sheet 2](#)



CRYSTALS AND GRAINS IN ROCK SAMPLES

- The lenses can be used to compare crystal sizes in granite or grain sizes in sandstone and limestone rocks.
- They can also be used to examine sedimentary rock for small shell or plant fossils.
- Use [Result Sheet 3](#)



SUGAR CRYSTAL SIZE

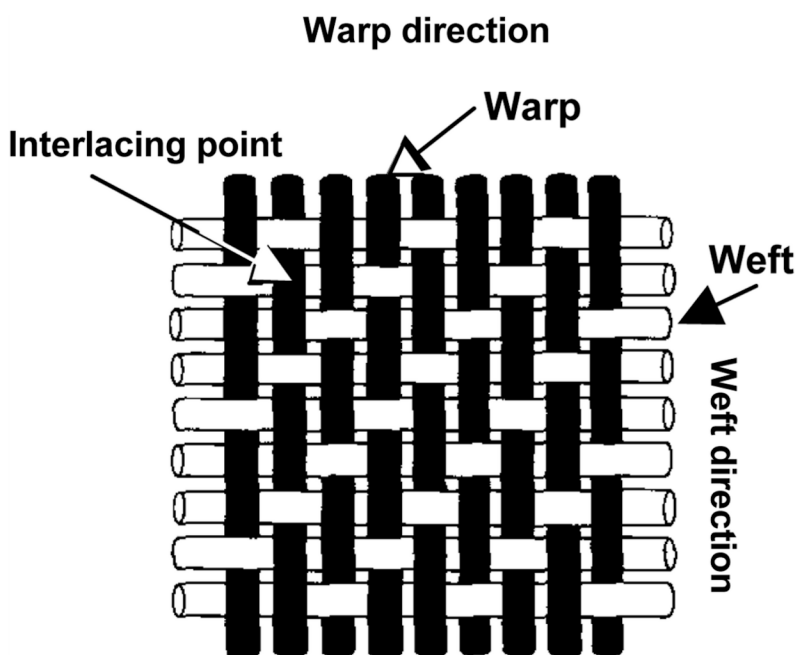
- The lenses can be used to compare crystal size in different sugars. Collect samples of Demerara, granulated, caster, icing and if possible larger candied sugar for examination.
- Use [Result Sheet 4](#).
- A possible extension activity could be carried out to time how long each type of sugar takes to dissolve in water. Plan a 'fair test' with the pupils so that only one variable changes. Possible variables which could be considered are hot or cold water, with or without stirring, quantity of water, quantity of sugar.





FABRIC SAMPLES

- The lenses can be used to count the number of threads in a cloth sample. Textile manufacturers do this to determine quality of a fabric.
- Count the number of threads per centimetre in each direction (warp and weft). If the fabric is coarse, count over 2cm. Knitted fabrics can also be examined but pupils need to be aware of the structure and loop shapes before trying to count threads.



The **warp** threads go the length of the fabric while the **weft** goes across.



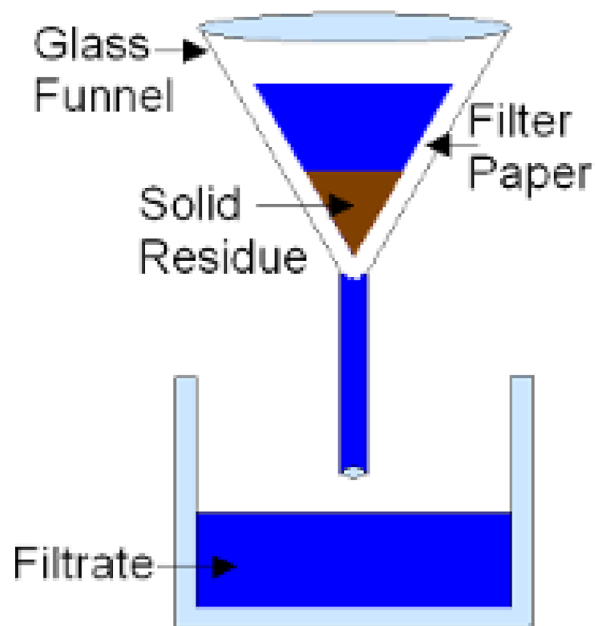
Knitted loops can be counted per 2cm.

- Use **Result Sheets 5 and 6**.
- Pupils can examine a variety of different fabrics to observe types of weave and knitted structures.



FILTER PAPERS

- When introducing the idea of how filtering works, it is a good idea to examine the paper or material for size of 'hole'.
- Collect pieces of: - tea bag material, coffee filters, j-cloth, kitchen towel, netting and different grades of filter papers. Pupils can examine the materials by holding them up to a light and see the 'holes'. Further examination under the lens allows for measurement of 'hole' size.
- The samples can then be used to filter muddy water. The size of particle that goes through the filter is smaller than the 'holes'.
- Use [Result Sheet 7](#).



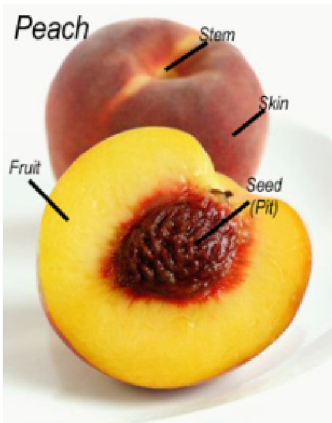
Filter paper
'holes'.



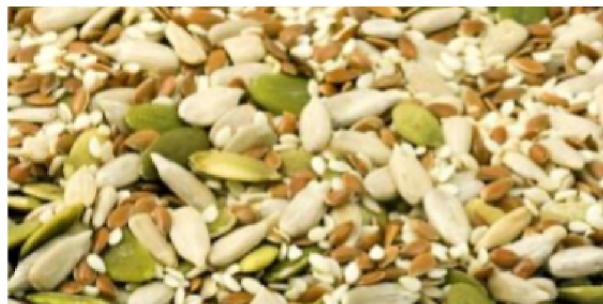
PLANT STUDIES

SEED SIZE

- An investigation can be carried out to test the following hypothesis; - The biggest fruits have the biggest seeds.
- Collect a wide variety of seeds from fruit.
- Suggested fruit seeds: - orange, apple, melon, grape, peach, plum, banana (they are the small black dots seen inside the flesh), pear, kiwi, tomato, strawberry.
- Pupils can measure the length of each seed type using the lens and length of the fruit using a ruler.
- Use **Result Sheet 8**



- As an extension activity pupils could list all the seeds that we eat or use.





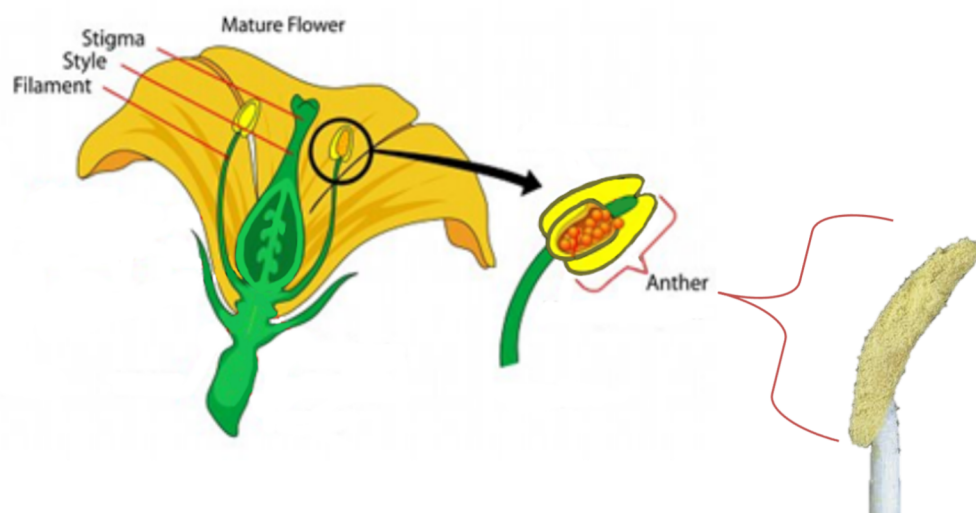
PLANT STUDIES

ANTHER SIZE

- Collect a wide variety of anthers from flowers.
- Suggested flowers: - daffodil, crocus, lily, tulip, buttercup, fuchsia, hibiscus, rose and carnation. Some flowers have anthers too small to see with the lenses provided.



- Pupils can draw each of the flowers and a diagram of their anthers before measuring the length of the anther of each flower type using the lens.
- Use [Results Sheet 9](#).





FINGERPRINTS

- The lenses can be used to magnify and compare the different patterns seen in fingerprints.
- Ridges form on our fingertips before we are born and form patterns which we call fingerprints. They do not change, they only grow with us.
- Since they don't change, scientists can compare fingerprints to see if a person was at a crime scene. They do this by looking at the patterns and comparing them to known samples.
- There are three basic patterns; loop, arch, and whorl.



Loop

Arch

Whorl

Use **Results Sheet 10** and follow the directions:

1. Take a pencil and smudge the lead on a spare sheet of paper.
2. Starting with your left little finger, rub it on the smudge until covered.
3. Take a piece of clear tape and place it on the flat pad of your finger, being careful to not get any creases in the tape. Gently press down.
4. Carefully peel the tape off your finger and place it in the left little finger box on your results sheet. Look at the photos above - what pattern is it?
5. Repeat the process for the rest of your fingers and thumbs.
6. Compare: Do any of your classmates have the same pattern as you or are they different? If you have a sibling, compare their fingerprints to yours; are they the same or different?
7. Do you or any of your classmates have fingerprints other than the three main patterns? Do you have any other unique features? (e.g. a scar)

TIPS AND INTERESTING FACTS

- Cut ten pieces of tape so you don't have to worry about it later and add to the pencil smudge when you need to.
- Loops can point to either your thumb or your little finger. There are some rare patterns other than those above. These are called accidental patterns and can be a combination of two or more patterns.
- Identical twins do not have identical fingerprints! This is because our genetics only have a small part to play in the formation of fingerprints. Small environmental changes in the womb (for example, if the fingertips are resting on anything) lead to slightly different patterns.