

Wonder Wool Investigations

Investigation 1 (KS1):

Which materials are the most suitable for making clothes?

Some children are being asked to wear new school uniforms made from some strange materials. Some of them look rather uncomfortable!

Questions to pose to the children:

- What materials do you think your clothes are made from?
How could you find out?
- Where would you look?
- Are any of them made from natural materials or are they all man-made?
- Can you sort the materials that your teacher has given you into man-made and natural fabrics?
- Which is the biggest group?
- What are your natural fabrics made from?

Some natural fabrics are made from cotton, which comes from a cotton plant. Others are made from silk, which is naturally made by a silkworm. The one that we are going to study for our project is wool, which comes from sheep.

Discuss ways to investigate the various questions with the children and how they can show what they have found out. For example, sorting and grouping materials according to criteria e.g. man-made or natural, waterproof or porous, soft or hard. Some classifying and grouping activities may require children to understand and use Venn diagrams. For example, using criteria such as man-made / waterproof: each material could have one or other property, or both or neither property.

Children can carry out a range of investigations to decide which is the most suitable material for a new school uniform.

Questions to pose to the children to stimulate discussion around potential investigations:

- What investigations could we do?
- Which material is the softest?
- Which material allows you to stretch it the most?
- Is one material stronger than another?
- Can you twist some of the materials more easily than others?
- Which other comparative tests could you carry out on the materials?



Ask the children to look at the images and discuss the advantages and disadvantages of each material with their partner. You may wish to find some more images for them to discuss too. These images are intended to stimulate discussion about the properties of different materials.



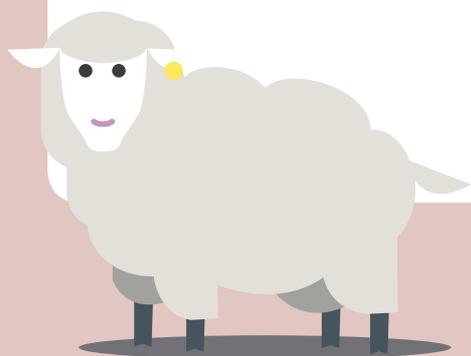
Clothing made from chain mail



Clothing made from bubble wrap



Clothing made from newspaper



Investigation 1 (KS2): Thermal insulation

How do the insulation properties of wool compare with other fabrics?

Questions to pose to the children:

- What do you think are the most important properties of wool?
- Clue: Think about where sheep live, what they need to survive in their usual habitats and how their fleece might help them.

Children need to consider how to plan and carry out this investigation and the variables / factors that they can change, measure or keep the same.

Questions to pose to the children to stimulate discussion around potential investigations:

- What investigations could we do?
- What will our question be?
- How will we carry this out?
- Are there safety considerations?
- What are the advantages of using a datalogger to measure the temperature of each beaker?
- What method will we use for setting up this investigation?

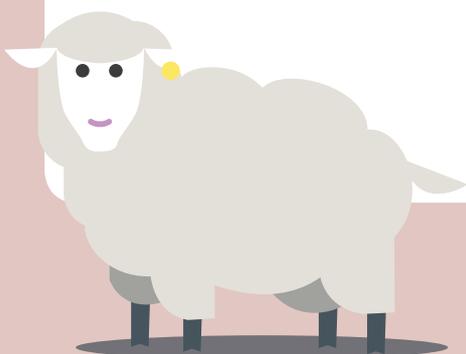
Children may suggest a good investigation to carry out. Alternatively, you may prefer to give them this suggested method:

Suggested method

- Wrap four beakers in different materials (e.g. knitted wool, felted wool, cotton, nylon, acrylic).
- Put the same amount of hot water in each beaker and leave them in the same place.
- Measure the starting temperature of each and place a lid on each.
- After a set time interval (such as every five minutes) measure the temperature of the water in each beaker with a thermometer or data logger.
- Record and discuss your findings.

Safety: The water temperature for the insulation investigation must not exceed 50°C (See CLEAPSS publication *P004: Safe heating for primary science* or the ASE publication, *Be Safe*).

If you are concerned about spillages you could use hot jacket potatoes and wrap them instead and measure the changing temperatures over time. If heating potatoes in a microwave oven, heat them until they are soft enough to push a thermometer in easily, and allow them to stand until they are at a suitable starting temperature (50 to 60°C). Control variables by choosing potatoes with a similar shape and weight.



Investigation 2 (KS2): Waterproof properties

How do the waterproof properties of wool compare with other fabrics?

Questions to pose to the children:

- What do you think are the most important properties of wool?
- Clue: Think about where sheep live, what they need to survive in their usual habitats and how their fleece might help them.

Children need to consider how to plan and carry out this investigation and the variables / factors that they can change, measure or keep the same.

Questions to pose to the children to stimulate discussion around potential investigations:

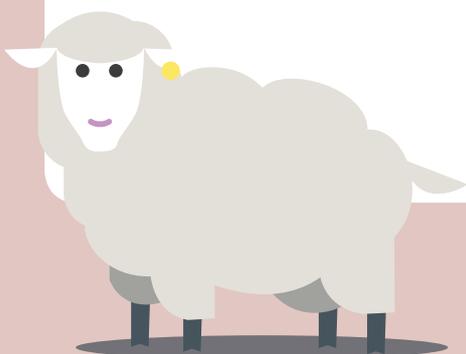
- What investigations could we do?
- What will our question be?
- How will we carry this out?
- What safety considerations are there?
- What equipment could we use to make our measurement more accurate?
- What method will we use for setting up this investigation?

Children may suggest a good investigation to carry out. Alternatively, you may prefer to give them this suggested method.

Suggested method

- Place a filter funnel in each of four 25 ml measuring cylinders.
- Cut 10 cm circles of four different fabrics such as wool, cotton, nylon, acrylic.
- Fold each fabric circle in half and half again in a similar way to a filter paper and place one in each funnel.
- Add 40 ml of water to each fabric in turn and time and record how long it takes for 20 ml to drip through.
- Feel each fabric and discuss / record your findings.

Safety: Spills should be mopped up immediately.



Investigation 3 (KS2): Sound insulation

How do the sound insulating properties of wool compare with other fabrics?

Questions to pose to the children:

- If you were working in a loud noisy factory, how could you reduce the volume of the noise going into your ears?

Children need to consider how to plan and carry out this investigation and the variables / factors that they can change, measure or keep the same.

Questions to pose to the children to stimulate discussion around potential investigations:

- What investigations could we do?
- What will our actual question be?
- How will we carry this out?
- What safety considerations are there?
- What equipment could we use to make our recording more accurate?
- How would using a datalogger / decibel meter make measuring the sound volume more accurate?
- What method will we use for this investigation?
- Which other fabrics could we test?

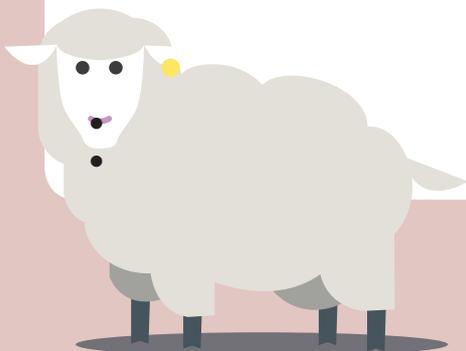
Children may suggest a good investigation to carry out. Alternatively, you may prefer to give them the suggested method below.

If a decibel meter / datalogger is not available, children may wrap the sound source in a layer of fabric and then walk away until the sound source can no longer be heard and record the distance.

Alternatively, you can download and use a free decibel meter app for a smartphone such as Decibel X.

Suggested method

- Cut 20 cm squares of four different fabrics such as wool, cotton, nylon, acrylic.
- Place a sound source on a soft surface e.g. cloth or foam.
- Cover the sound source (phone, buzzer or bell) with a piece of fabric.
- Measure and record the sound (decibel / dB) level of the sound source using a decibel meter / datalogger placed 50 cm away from the source.
- Repeat this until all the fabrics have been tested.
- Discuss/note down the findings.



Investigation summary task

Children should write a conclusion that explains their results using data and observations from their investigation work. Ideally, this will explain which fabric is most suitable overall or, if there is no overall best fabric, it should compare the thermal insulation and waterproof properties of the different materials.

Once children have written a well-reasoned conclusion that explains their results, they can use it to contribute to their wool design and evaluation sheet.

