**Activity: Exploring wool fibre properties**

By the end of this activity, students should be able to:

* describe the cellular structure of wool fibre
* identify wool’s properties and their relationship to the fibre structure
* understand how wool’s properties affect its suitability for particular end uses.

**Introduction**

Wool was made into cloth for many years before recorded history. Developing a better understanding of the wool fibre has enabled scientists to develop new technologies and processes for converting it into useful products.

Wool has a complex physical structure that is responsible for the range of desirable properties it exhibits in products. Understanding this structure and how it creates these properties is helpful for developing a better understanding of wool’s properties and its uses.

Understanding a material’s properties is essential for making informed decisions about material selection for particular purposes.

**What you need**

* Printed copies of the exploded wool fibre diagram and lists of fibre components and properties.
* Access to the interactive [Wool fibre structure and properties](https://www.sciencelearn.org.nz/image_maps/61-wool-fibre-structure-and-properties).
* Access to or printed copies of the article [Wool fibre properties](https://www.sciencelearn.org.nz/resources/875-wool-fibre-properties).

**What to do**

1. Brainstorm what students already know about wool. List the outcomes of the discussion on the whiteboard in 3 columns: Uses, Desirable properties, Undesirable properties. Ask about students’ experiences and preferences for wearing wool garments as opposed to other fibres. What garments and other products are made from wool and why is wool used? What are some of the properties wool brings to the products that make them suitable for their use? Are there any undesirable properties? Some properties may be considered both desirable and undesirable depending on the use of the fabric, for example, the ability to felt allows you to make fabrics with different characteristics but it makes fabrics difficult to care for if they don’t have a special finish applied.
2. Have students explore the interactive [Wool fibre structure and properties](https://www.sciencelearn.org.nz/image_maps/61-wool-fibre-structure-and-properties) and read the article [Wool fibre properties](https://www.sciencelearn.org.nz/resources/875-wool-fibre-properties). Follow this up with discussion and add to the lists on the board.
3. Using the resources below, students label the parts of the wool fibre and match the property names to the part of the wool fibre that creates that property. This could be done in small groups or individually first and shared in pairs or small groups.
4. When students have completed the activity have them feedback any difficulties and refer back to the article [Wool fibre properties](https://www.sciencelearn.org.nz/resources/875-wool-fibre-properties) to resolve these.

**Extension ideas**

* Have students consider how the properties of wool make it suitable for particular end uses by completing the chart [Wool products’ function and properties](#WoolProductsFunctionAndPropeties). Referring to the interactive [Wool fibre structure and properties](https://www.sciencelearn.org.nz/image_maps/61-wool-fibre-structure-and-properties) and/or the article [Wool fibre properties](https://www.sciencelearn.org.nz/resources/875-wool-fibre-properties), encourage students to think of more than 1 property that makes wool suitable for particular products and purposes and to add more wool products to the list.

**Wool fibre diagram**

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**Wool fibre properties**

|  |  |
| --- | --- |
| Low abrasion resistance | Water-resistant |
| Sensitive to chemicals | Good absorbency |
| Good insulator | Good breathability |
| Resistant to soiling | Holds colour well |
| Stain-resistant | Flame-resistant |
| Antistatic | Good elasticity |
| Resilient | Good wrinkle recovery |
| Ability to felt | Good drape |

**Wool fibre components**

|  |
| --- |
| Macrofibril |
| Cortex |
| Cortical cell |
| Cuticle |
| Microfibril |
| Twisted molecular chain and helical coil |
| Matrix |

**Wool products’ function and properties**

|  |  |  |  |
| --- | --- | --- | --- |
| **Wool product** | **Function/purpose** | **Wool properties that make the product fit for purpose** | **Explanation** |
| Felt hat |  |  |  |
| Singlet |  |  |  |
| Socks |  |  |  |
| Knitted jumper |  |  |  |
| Winter coat |  |  |  |
| Carpet |  |  |  |
| Ceiling insulation |  |  |  |
| Duvet inner |  |  |  |
| Mattress cover |  |  |  |
| Evening dress |  |  |  |
| Tramping clothes |  |  |  |
| Upholstery |  |  |  |
|  |  |  |  |
|  |  |  |  |