

Understanding Sustainability

**Is natural always better than synthetic?
Cotton v Synthetic**

Comparing cotton and polyester fabrics

Is natural always better than synthetic?

Cotton v Synthetic

Teacher notes

These activities compare cotton fabric with a synthetic fabric. Any synthetic fabric can be used. Polyester is readily available.

Activity **Testing material properties**

Completed in one lesson (60 minutes).

Students are challenged to design experiments that compare cotton and polyester. The context is choosing a fabric that would be suitable for making an outdoor coat. Suggested tests include:

- Resistance to abrasion.
- Water-proof ability.
- Weight when dry and wet.
- Washability.
- Washability.

Students can also consider factors such as the cost (affordability) of the materials. The impact of the production and use of the two materials (social, economic and environmental) are examined in the life cycle analysis activity.

Differentiation The worksheets have increasing levels of detail. This allows you to choose the appropriate level of information for your class.

Sheet reference	Content
Student 1 (most able)	Simply describes that the task is to test which fabric would be the best. No further guidance. Two copies are made on one page.
Student 2	Describes the task and suggests some of the properties that the students may want to consider in testing the fabric. Does not suggest methods for the range of tests.
Student 3	Gives methods for the tests. Does not give any information on presenting results.
Student 4 and 5 (less able)	Sets out tables for results.

Resources

The equipment will depend on the complexity of the tests designed by the students. A suggested set of equipment for each group would consist of:

- 4 squares of each fabric (roughly 10cm x 10cm)
- 250cm³ beaker
- 25cm³ measuring cylinder
- small piece of abrasive sandpaper
- stirrer (glass rod or similar)
- access to electronic balance
- access to water supply
- safety glasses as required
- stop clock

Risk assessment

A full risk assessment should be undertaken by the class teacher before carrying out any of the suggested activities.

Outdoor coat

What is better? Cotton or synthetic?
Which fabric is more sustainable?

You need to choose a fabric that will be used to make an outdoor coat.

What properties would you want from a coat that you wear outside?

Test the fabrics

- What scientific tests can you do to see which material is best?
- How can you make the comparisons fair and reliable?
- Go to **www.sustainability-ed.org** to compare the sustainability of cotton and polyester.
- Which is the most sustainable? Give reasons for your answer.



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Outdoor coat

What is better? Cotton or synthetic?
Which fabric is more sustainable?



You need to test two fabrics for an outdoor coat.

Think about the properties that the coat will need to have.
What would you want from a coat that you wear outside?

You only have a few samples of the two fabrics.
Some tests could damage the fabric.

Think about the best order to do the tests.

You may think about testing things like:

- How tough is the fabric? What happens if it rubs against something rough?
- Is the fabric waterproof?
- How heavy is the fabric? Is it light enough to make a coat?
- What happens if the fabric gets wet? How long does it take to dry?
- What happens if the fabric gets dirty? Can it be washed easily?

Fair test

What scientific tests can you do to see which fabric is the best?

Make sure they are controlled so that they give a fair comparison of the two materials.

Go to www.sustainability-ed.org to compare the sustainability of cotton and polyester.

Which is the more sustainable? Give reasons for your answer.

What is better? Cotton or synthetic?
Which fabric is more sustainable?



How tough is the fabric?

1. Take a square of fabric and place it on a flat surface.
 2. Rub the material with a piece of sandpaper.
Take care with the rough sandpaper.
 3. Count how many strokes it takes before the fabric is damaged.
- How can you make sure that each fabric gets the same treatment?
 - How can you measure the amount of damage?

How heavy is the fabric?

1. Measure the dry fabric's area.
 2. Weigh the piece of dry fabric.
 3. Calculate the fabric's weight per square centimetre.
 4. Soak the fabric in water.
 5. Weigh the wet fabric.
- How can you measure the wet cloth without damaging the electronic balance?

Is the fabric waterproof?

1. Put 10cm³ of water into a measuring cylinder.
 2. Stretch the fabric over the top of the measuring cylinder and turn it upside down over a beaker to collect the drips.
 3. Measure how much water leaks through the cloth in 1 minute.
- How can you get reliable results?

Which fabric is easiest to get clean?

1. Rub some soil or other dirt into a small part of the fabric.
 2. Wash the fabric in a beaker of water.
 3. Look to see how well the dirt has been removed.
- How can you give both fabrics the same amount of dirt?
 - How can you wash them the same?
 - How can you judge the amount that the dirt has been removed?

Which is the more sustainable fabric?

Go to www.sustainability-ed.org

In the case studies section, look at cotton and polyester.

Which is the most sustainable? Give reasons for your answer.

Outdoor coat
Cotton or synthetic?
Results

How tough is the fabric?

Type of fabric	Cotton	Synthetic
Number of strokes to cause damage		
Toughest material (✓)		

How heavy is the fabric?

Dry fabrics	Cotton	Synthetic
Area of fabric (length x width)	cm ²	cm ²
Weight of fabric	g	g
Grams per square centimetre	g.cm ⁻²	g.cm ⁻²
Lightest fabric when dry (✓)		

Wet fabrics	Cotton	Synthetic
Area of fabric (length x width)	cm ²	cm ²
Weight of fabric (grams)	g	g
Grams per square centimetre	g.cm ⁻²	g.cm ⁻²
Lightest fabric when wet (✓)		

Is the fabric waterproof?

Volume of water let through the fabric in 1 minute	Cotton	Synthetic
Test 1	cm ³	cm ³
Test 2	cm ³	cm ³
Test 3	cm ³	cm ³
Average for three tests	cm ³	cm ³
Most waterproof (✓)		

Does the fabric wash easily?

Type of fabric	Cotton	Synthetic
Dirt level after washing		
Easiest to get clean (✓)		

Conclusions

Which fabric should be used to make an outdoor coat?
 Give reasons for your decision.
 Think about the fabric's properties and their sustainability.

Sustainable Development**Your task**

Visit www.sustainability-ed.org and then answer the questions.