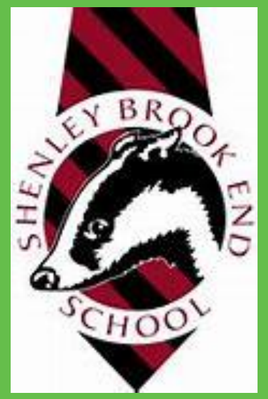
Design and technology - Understanding fibres and fabrics

Technical textiles



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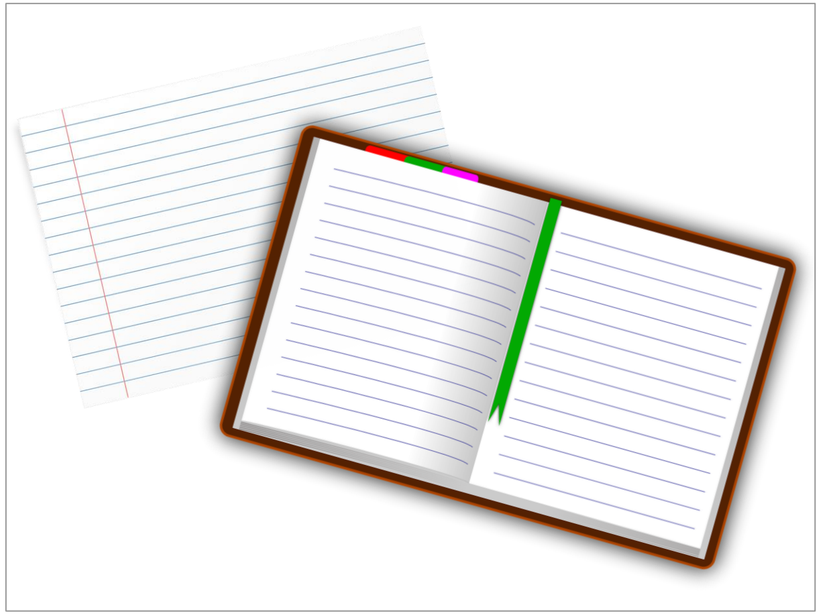
Please either go through this PowerPoint or click on the link below to watch the video that talks you through the PowerPoint.

The impact of fashion (thenational.academy)

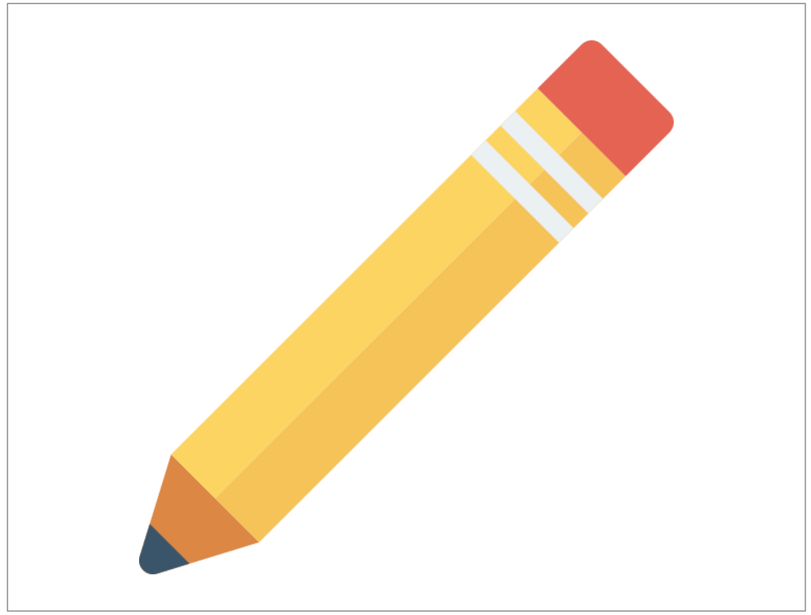
In this lesson, you will need:

Exercise book or paper



Pen

Pencil



Credit: Pixabay

What we will explore in today's lesson...

Modern and technical textiles

Protective materials

Future of fabric

Fastening challenge

Keywords

Modern materials are materials that have been engineered to improve their properties.
Composite material is a combination of two or more materials with different physical properties.

Keywords

Fastenings are items used to hold our garments together.
Smart materials are intelligent textile structures or fabrics that can sense and react to environmental stimuli.

Modern material

Modern materials

Modern materials are those that are continually being **developed** through the **invention** of **new** or **improved** **processes.**

Let's start thinking about materials with industrial use.

Credit: Pixabay

Composite materials

Composite materials are produced by bonding at least **two different materials** to produce a **new material** with **improved properties** for a **specialist job**.

Composite materials are often used to replace metals.

Why do you think this is?

Credit: Pixabay

Properties of composites

Design flexibility

Can be moulded and formed into nearly any shape.

Durability

Composites can withstand environmental factors and do not rust.

Lighter than metal

Composites are often lighter than metal!

Strength to weight ratio

Super light and super strong!!

Glass reinforced plastic

This is **polyester resin** reinforced with glass fibre strands - you probably have heard of **fibreglass**?

Fibreglass is **strong**, **light** and **easily repaired**.

It is available as **matting** or a **woven fabric** which adds to the aesthetics.

Can you think of some products made from fibreglass?

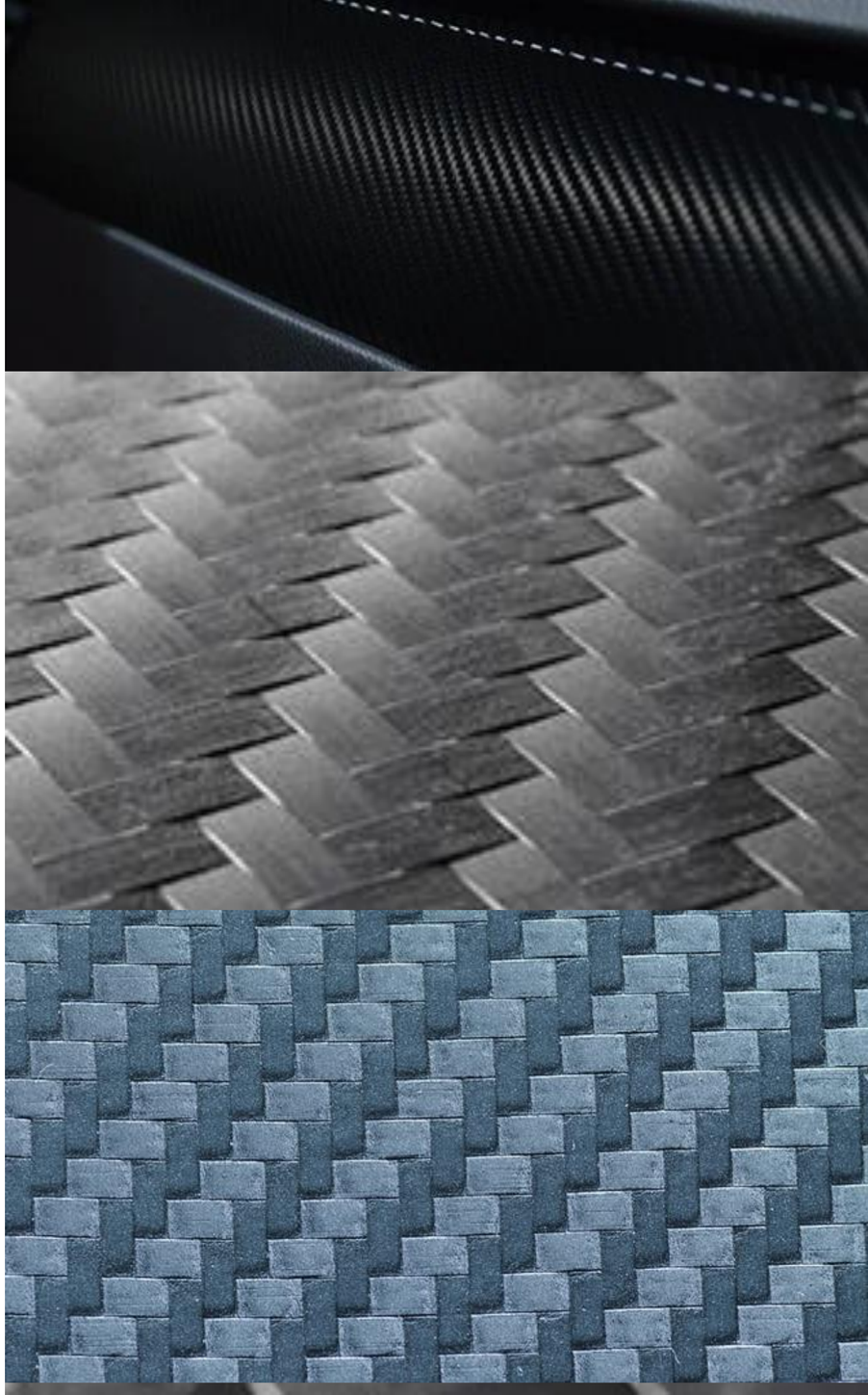
Credit: Pixabay

Carbon fibre

Carbon fibre is **woven** into a textile material. Epoxy resin is added as a hardener and the item is baked.

The resulting material is very **strong** and **light**. An improvement on GRP, although much more **expensive**.

Can you think which sports may use carbon fibre?



Credit: Pixabay

Pause the video to complete your task

Carbon fibre in sports

Collect images or write a list of sports where you have found the use of carbon fibre to make equipment. You could think about paralympians too.

Resume once you’re finished

Fighter jets and the panels of race cars are built of the same composite material.

True

False

It's **False**! They both use composite materials, but military jet bodies use alloys, which are composites containing metal.

Protective fabrics

Nomex

Nomex is a **fire-resistant** material that does not drip or melt! Its **fibres** thicken when exposed to heat and can withstand heats up to 370℃.

Firefighting, military aviation, and motor racing industries use Nomex to create clothing and equipment that can withstand intense heat.

How hot can it get in a race car cockpit?

50℃

Credit: Pixabay

Kevlar

Originally used to replace steel in race car tyres - Kevlar is a liquid, turned into a fibre with protective properties.

Kevlar fibers are so tightly spun that it is nearly impossible to separate them, making it a **strong** material, that **cannot be cut** and is **heat-resistant**.

What products do you think kevlar is suitable for?

Credit: Pixabay

Biometric sensors

Not really the fabric itself - but **sensors** are being **woven** into fabrics that can give vital information about the amount of oxygen in your blood, pulse rate and movements after an incident.

If you were a jet pilot or racing driver how could this save your life?

Credit: Pixabay

A motorbike race suit has a built in airbag?

True

False

It's **True**! Another protective life saving product where fabrics are used.

Smart fashion

Smart Materials

Phosphorescent

Absorbs and then radiates light.

Photochromic

Reacts to light.

Thermochromic

Reacts to temperature.

Hydrochromic

Reacts to water.

E textiles

Electronic textiles have a **digital component** embedded in them.

Designed and manufactured and designed to integrate technologies that offer the user **greater functionality.**

The purpose of smart fabrics is to provide added value to the user, whether **for pleasure, performance, or safety**.

Credit: Pixabay

Smart & E textiles

What functions do you think you would want?

Pleasure

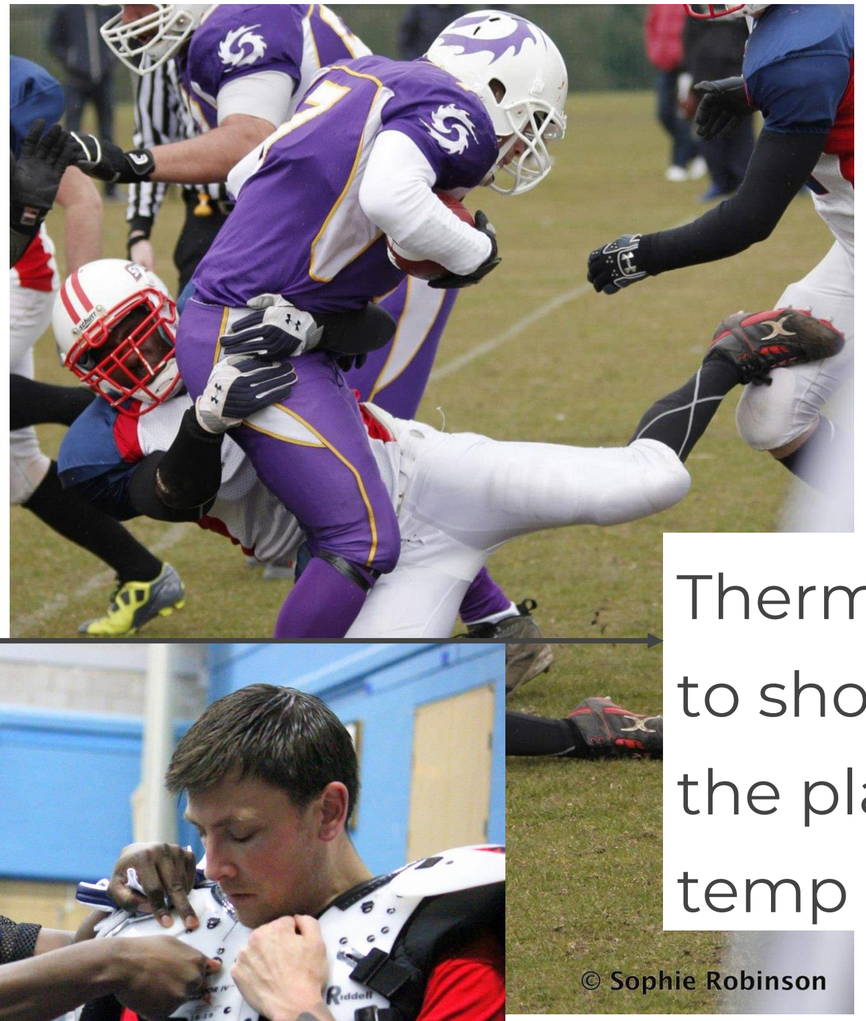
- Glow in the dark watch face and clothing.
- Colour changing swimwear.
- Colour changing glasses lenses.

Health & performance

- Shape changing for exercise.
- Medical readings.
- PFR for asthmatics.
- Weight and sleep tracker.

Safety

- Sharing one's location.
- Temperature regulation.
- Airbag.
- Fireproofing.



Thermochromic lines to show medics when the players body temp is too hot.

Credit: Sophie Robinson Sports Photography

Pause the video to complete your task

Smart materials and E textiles

Redesign my sports kit - using smart and electric materials.
You could sketch and annotate or write notes but please justify your ideas.

Resume once you're finished

Mechanical Fastenings

Fastenings are a common **component** of textiles.

Components refer to any resource that is used to complete the construction of a textile product.

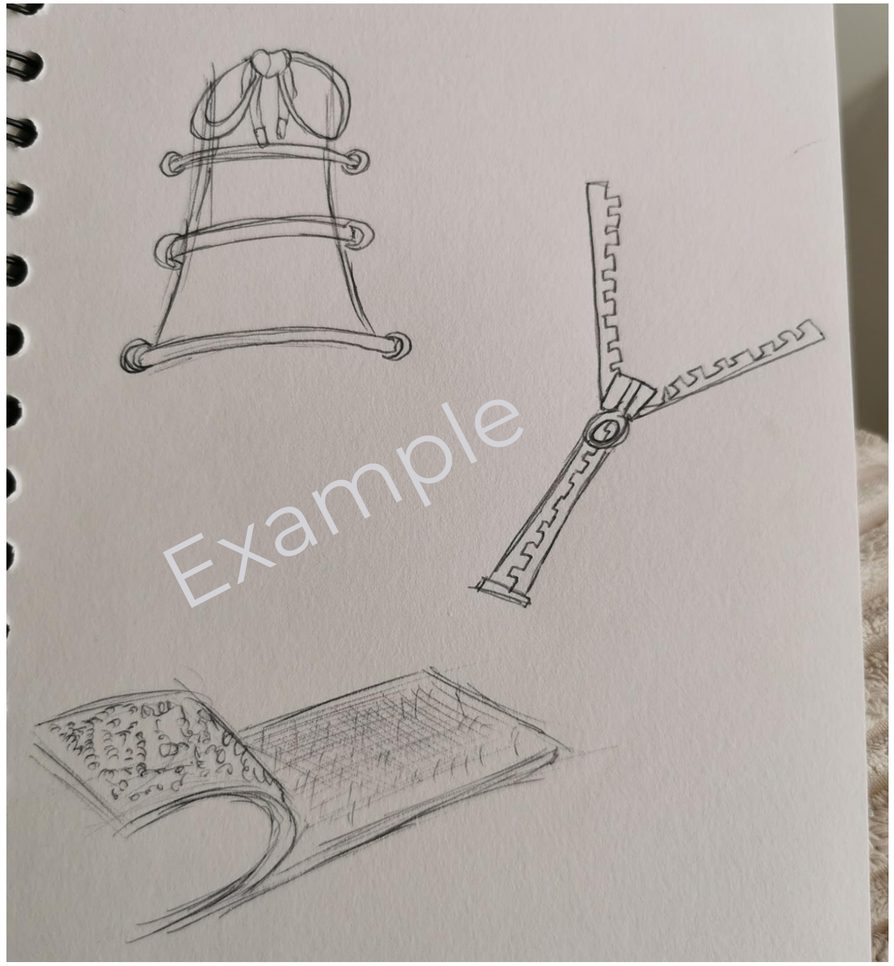
Credit: Pixabay

Fastenings task

Task

Sketch as many fastening components as you can.

Write a **brief explanation** and **list some products** you can think that uses them and **why** it is chosen for that product.



Fastenings task

Find images of each fastening component and list as many products you can think that uses them.

Zips

Buttons

Press fasteners

Eyelets

Velcro

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