

## Investigation for research

Before, during and after designing and making prototypes and products, information needs to be gathered. This information is used to help ensure the design fully meets the clients needs.

### Primary data sources

Things you do yourself-new research  
Interviews, questionnaires, case studies, physical material testing, product analysis, observations, taking measurements

### Secondary data sources

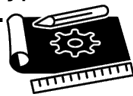
Data obtained by secondary sources that other people have gathered and presented first



Written articles like books, magazines, Internet pages, official data or statistics, media such as news, radio and television, exemplar work of students or designers

## Model construction

Using cheaper materials than a final prototype, sketches can be turned into something 3D. Recording the models with photographs or videos is a great way to record your development.



Models can test a part or whole of the product. It can be made at a different scale, depending on what the purpose is of the model.

Modelling textiles often requires making a toile garment, which is a full version made from a cheaper material. For electronic circuit modelling you may use a breadboard.

It is important that as a result of modelling we consider what must be improved and how we intend to do this.



## Developing successful prototypes

In order to produce a successful prototype you must complete the following 5 points:

1. Satisfying the clients design brief: address the clients wants and needs
2. Innovation: Imagination and creativity means it should not be directly copying something that already exists
3. Functionality: Making sure it can perform the task it was made to do
4. Aesthetics: Produce a prototype that looks good enough to sell with a high quality finish
5. Marketability: The prototype should be either useful, entertaining or desirable, it needs to fill a gap in the market

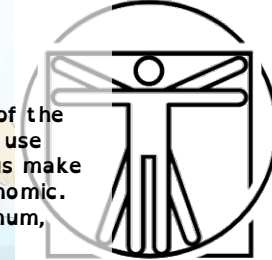
PRODUCT DESIGN

## Ergonomics

Ergonomics is the study of how humans interact with objects. It is based on scientific study. It measures physical and emotional interactions, such as reach, grip, smell, touch etc.. We often talk about ergonomics being about how comfortable a product is and how easy it is to use. Can you think of a product that has changed over time to be more ergonomic?

## Anthropometrics

Anthropometrics is the study of the measurements of humans. We use these measurements to help us make out products to be more ergonomic. Anthropometry records maximum, minimum and average data.



## Modern materials

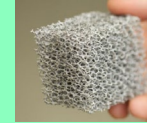
Modern materials use the latest advances in technology which gives us new materials and ways of working with materials.



Corn starch polymers



Graphene



Metal foams

## Smart materials

Smart materials have properties which can change and change back. These changes happen due to a change in the environment around them.



Thermochromic



Photochromic



Shape memory alloy

## Technical textiles-a textile that has been developed with enhanced properties

### Gore-Tex

Often sewn as a membrane between layers of other fabrics. Waterproof and breathable allowing sweat to escape and reduced condensation



### Kevlar

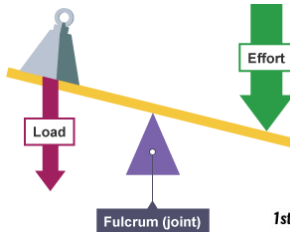
Kevlar has a high tensile strength, high heat resistance and is extremely hard-wearing. It is a flexible and lightweight fibre known as an aramid (which are modified nylon fibres). As well as this it has useful acoustic properties



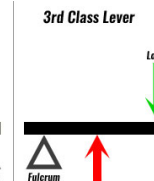
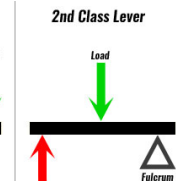
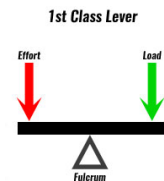
## Mechanical devices

### Levers

A lever is a very simple way to gain mechanical advantage. This can making lifting or moving something much easier. They have two parts a bar and a pivot, called a fulcrum. 3 areas to consider are the effort (input), the load (output) and the position of the fulcrum.



$$MA = \frac{\text{Load}}{\text{Effort}}$$



## Linkages

A linkage is a mechanism made by connecting rigid parts. Linkages can change the magnitude of a force or transform it into a totally different motion.

