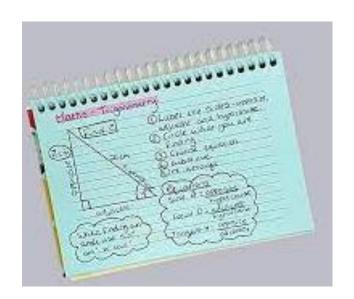|	**Year 11 Engineering**
What concepts will we be covering this half term?	**Curriculum mapping for students** • What content/concepts will you be covering this half term? Unit R105 – Theory work for assessment • Theory work has already been taught at the beginning of year 10, but how much can you remember? The information on the PP slides provided needs to be understood and recalled the assessment that you may be asked to do. • Key words/Power words: Market pull / technology push. Consumer choice. Market research. Social, moral, cultural issues. Environmental issues. Consumer rights and legislation.
What resources can you use to support your learning?	• Definition PP • You can also do further research on the internet, to help you to understand any terms that you do not understand from the PP
Tasks to complete so we can assess your understanding/ Key Performance Indicator tasks	• The PPs that you will see on the PP slides provided are dull, boring and very forgettable. • How can you make the information easier to understand and remember? • Make revision cards for each of the slides which are colourful, makes use of pictures and images, and most importantly cuts down on the information. • Then use these revision cards to help test your knowledge and understanding of each topic.
What can you do if you need help/ support?	Email h.harpham@netherthorpe.derbyshire.sch.uk Send a message to SMHW (will not be picked up as quickly as email).

Revision Cards

If done well, revision cards can help you to simplify and recall information much more easily.

The PPs that you will see on the next few slides are dull, boring and very forgettable.

How can you make the information easier to understand and remember?

Make revision cards for each of the slides which are colourful, makes use of pictures and images, and most importantly cuts down on the information.

Then use these revision cards to help test your knowledge and understanding of each topic.

Wider influences on new products

The opportunity for new products arises from developments in technology or customer need. The effective design of these products does not just consider how they work. It also has to take into account a broad range of issues, including social, cultural, market and environmental factors.

Market pull, technology push

Designers identify the opportunity to develop new products based on technology push or market pull.

Technology push
Technology push is when products are re-designed because of changes in materials or manufacturing methods. This might mean that new materials have become available, with improved properties; or that improvements in manufacturing processes mean a manufacturer can make the product cheaper or more efficiently, which reduces manufacturing costs.

Market pull
Market pull is when product ideas are produced in response to market forces. Examples of market influences include:
A demand from consumers for new or improved products.
A competing product is launched by another manufacturer.
A manufacturer wants to increase their share of the market.

Other reasons
Sometimes a designer will design a new or improved product simply because they believe that the very existence of the product will create market pull. Designs like this may succeed or fail, depending on consumer demand, how innovative the product is, and the state of the market.

Consumer choice

Once a designer has identified an opportunity for a product, the next step is to identify the detail of what consumers want. To do this they need to identify who the different customers are and what they are looking for, eg a choice of different styles, performances and prices.
For example, car manufacturers design slightly different versions of the same car model to suit individual drivers' different tastes.

Market research

Market research is used to find out what people want. Interviews and/or questionnaires are used to gather people's views on the products they like, the functions and features they require and the amount they would be prepared to pay.
Sometimes research is carefully focused on a particular group of people, for example: women, a certain age-range, a certain salary level

Social Moral Cultural

A designer doesn't just think about the way that a product will work. They also consider how it will be made and how it will be used. This means that the designer has to be very aware of what is acceptable and what is not acceptable to society.

Issues with making products

Most people would prefer the products they want to be low cost and good quality.
One way of reducing the manufacturing costs is using computer controlled machines or robots to make the products. A negative effect of this is that fewer people are employed. A positive effect is that computer-controlled systems create jobs for highly-skilled workers to develop, program and maintain these systems.
Another way of reducing costs is to make products in countries where labour costs are low. Sometimes the conditions for workers in these countries are far below UK standards. Pollution may also be higher. There is also an environmental cost in transporting goods all over the world.

Issues with using products

New products influence society and how we live our lives. Many of these changes are positive, but the designer also has to consider the possible negative effects.

For example, mobile phones are a relatively recent invention. They brought more social interaction - people can keep in touch while on the move. And they help in emergencies.

However, using them inappropriately, such as when driving, increases the risk of accidents. Some people also get irritated when others have loud phone conversations in public places.

If mobile phones are seen as 'fashion items' then people buy new phones even though their old one is still working. This wastes resources and has a negative effect on the environment.

Cultural influences on design

Culture is the way that history and beliefs influence society. This varies a lot between countries or even between different groups within the same society. Culture has a big influence on what people regard as 'good' and 'bad' design.

For example, in South Africa red is the colour of mourning. However, in China red symbolises good fortune. Trying to sell the same red product in those two countries would get a very different response.

In Japan, traditionally people sit on the floor to eat the family meal. The design of dining furniture for Japan is very different to that in Europe.

The designer has to investigate each cultural group that might be affected by a product to ensure that the design is suitable.

Environmental issues

Making a product uses resources, such as raw materials and energy. This has an impact on the environment.

There are a number of things that a designer might think about to reduce environmental impact:

The material used to make the product.

The life of the product.

What happens to the product at the end of its life.

Materials and the environment

One way to reduce impact on the environment is to use less material in the product. This might mean asking questions about what is needed or whether it could be made smaller (or thinner) and still do the same job. It could also mean using an alternative material with better properties, so that not as much of the material is required.

Wood

Timber is a renewable resource, which means that if forests and woodlands are carefully managed, we will never run out of it. Timber is easy to reuse and can be burnt to produce heat when at the end of its natural life. It is also biodegradable.

Metals

Most metals are relatively easy to recycle and reuse, and there are advantages for manufacturers. It is 20 times more efficient to recycle aluminium cans than to make new ones.

Plastics

Although most plastics are not biodegradable, they can be recycled and reused. Polystyrene vending cups can be recycled to make items such as pencils and rulers, and plastic carrier bags can be reused.

The 6 Rs

A young girl puts a plastic bottle into a marked recycling bin.

The 6 Rs are an important checklist. They are used by designers to reduce the environmental impact of products. They can also be used to evaluate the environmental impact of other products. The 6Rs stand for:

Reduce -is it possible to reduce the amount of materials used? This will help to protect valuable resources.

Rethink - is there a better way to solve this problem that is less damaging to the environment?

Refuse - this means not accepting things that are not the best option for the environment. For example, is the packaging really needed?

Recycle - could recycled materials be used, or is the product made from materials that are easy to recycle?

Reuse - could the product have another use? Could its parts be used in other products? Is this information clearly communicated on the product? This will extend its life.

Repair - is the product easy to repair? This will extend its life.

Product life

Most products have a limited life. This means that eventually they stop working, are worn out or are thrown away. Designers have to consider how long a product will last and what will happen when it is no longer needed.
A product with a long life uses less material than several short-lived replacements. This is good for the environment. However, a longer life also means that the manufacturer will sell less replacement products.
One way of extending product life is using better materials – like stronger materials or materials that resist corrosion. Another way is through design to allow their life to be extended by maintenance.

Design for maintenance

Maintenance means any activity which allows the product to have a longer life. It can include anything from repairing worn out parts to replacing batteries.
Designing a product to allow maintenance may mean including features such as access panels and standard screws. These help to allow parts to be replaced.
Alternatively, products might be made from a series of standard modules. This would mean that if it went wrong, only the faulty module would need to be repaired or replaced.
Using modular design also makes it easier to upgrade and improve products as there are new developments and improvements in technology.

Disposal

At the end of their useful life, most products are disposed of in some way. How this is carried out can have a significant effect on their impact on the environment.
A large proportion of products that we use currently end up in landfill – this means that they are buried in underground rubbish dumps. This is one of the least environmentally friendly methods of disposal.

Recycling

Recycling means reprocessing a material so that it can be used again. This helps to reduce damage to the environment by reducing the need for new materials. For example, this might mean melting plastic parts so that they can be shaped into new products. Symbols are used on plastic products to show the type of plastic used, so that it can be sorted into different types and recycled.

Biodegradability

If it is essential to dispose of a product in landfill, ideally the material should be biodegradable. This means that it will decompose (naturally break down) relatively quickly into naturally-occurring substances - as opposed to non-biodegradable ones that take many years to decompose.
For example, most plastics made from oil are not biodegradable and may take hundreds of years to break down. Whilst there may be limited options for the product itself to use biodegradable materials, this is an especially important factor when considering packaging materials, which are usually thrown way without any further use.

Consumer rights and legislation

For many products, society has laws and standards that the designer must meet. These help to protect the users, by specifying that products meet certain requirements and have suitable levels of safety. The Laws also allow consumers to get their money back if goods are found to be faulty or if products do not perform in the way claimed by the manufacturer.

A law is a formal rule adopted by Parliament and enforced by the government.

A standard is a guideline which is widely accepted. Standards do not necessarily have the force of the law.

The Consumer Protection Act 1987

This protects the public by:

prohibiting the manufacture and supply of unsafe goods

making the manufacturer or seller of a defective product responsible for damage it causes

allowing local councils to seize unsafe goods and suspend the sale of suspected unsafe goods

prohibiting misleading price indications

The Trade Descriptions Act 1968

The Trade Descriptions Act makes it an offence for a trader to make false or misleading statements about goods or services. It carries criminal penalties and is enforced by Trading Standards Officers, making it an offence for a trader to:

apply a false trade description to any goods

supply or offer to supply any goods to which a false trade description has been applied

make certain kinds of false statement about the provision of any services, facilities or accommodation

Standards

Kitemark symbol

In the UK, standards are regulated by the British Standards Institution (BSI). Products which meet these standards can be marked with the KiteMark.

CE symbol

There are also separate standards for the European Union. If a product meets these, it can be given a CE Mark. The marks show government officials that the product conforms to a standard, which enables it to be legally placed on the market within their country.