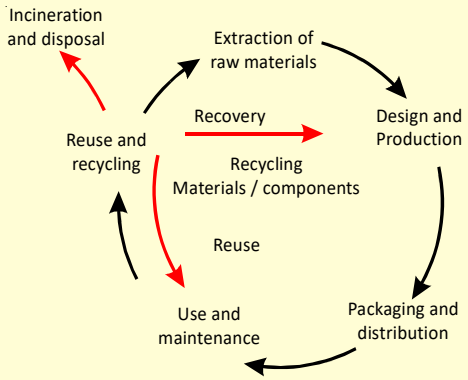
The roles, responsibilities and rights of the Designer.

When you are designing you should think carefully about the value of what you are doing. Sometimes you will be trying to solve a real problem, on other occasions you will be trying to improve on an existing design or on other occasions you may be trying to create a 'need' which wasn't there before in order to make money.
As designers you need to consider your moral obligations as well as commercial ones. Over the years authors such as Victor Papanek *(Design for the Real World)* and Vance Packard *(The Waste Makers)* have explored the ethical issues behind design. In the 1950's it was said that "design is where dishonesty came into the American way of life". The early industrial designers (such as Raymond Loewy) have been accused of using design as a marketing tool rather than as a way of improving the quality of peoples lives or the environment.
Planned obsolescence is a term that is used to describe when a product is deliberately designed to have a limited lifespan so that it will need to be replaced and thus generate more sales.
Over recent years people have become more aware of how 'consumerism' can impact on the environment and designers are becoming more concerned with the materials they use and how these can be minimised or used in a way that means they can be recycled at the end of a products life.



Sustainability:

Sustainable design is where things are designed in such a way that they do not have any long term negative effects on the environment. It requires only the use of renewable resources. The rapid growth in human population, the depletion of natural resources and long term damage to ecosystems is making sustainable design increasingly important, however there are limits to how much sustainable design can do to reduce damage to the earth. The growth in demands for goods and services is consistently outpacing the gains in efficiency which can be achieved. The problems include: the increasing difficulty of improving efficiency, the difficulty of introducing new technologies in societies built around old ones, that the physical impacts of delivering goods and services are global not national, and that the use of resources is growing and not stabilizing. Designers need to take responsibility for their designs and be aware of the need to protect our environment and raw materials. The carbon footprint of a product is the total Greenhouse gases (GHGs), eg carbon dioxide, produced during its lifetime. These include the making, transportation, use, and final disposal of the product.
In most cases this is difficult to calculate but we do know that the more energy used to make a product the bigger its carbon footprint.
The 'footprint' includes the power used to run or recharge the product.



Design Process

Finite and renewable resources

Finite resources from the Earth's crust, oceans and atmosphere are things that will one day run out. They can be processed to provide energy and useful materials.
Renewable resources are those which will not run out in the foreseeable future.
One of the most important finite resources in the crust is crude oil. Crude oil is processed to make a wide variety of useful chemicals. Sea water is a renewable resource because there is such a large amount of it that humans will not use it all up.

Waste disposal

Waste disposal is the collection, processing, and recycling or deposition of the waste materials of human society. Broadly speaking, waste materials are either liquid or solid in form, and their components may be either hazardous or inert in their effects on health and the environment. The term waste is typically applied to solid waste, sewage (wastewater), hazardous waste, and electronic waste.
Landfill is one of the most common methods oforganised waste disposal around the world. It simply involves putting waste into the ground and burying it. This can cause a large number of problems such as the contamination of ground water and soil. Decaying organic material can also generate methane gas which is flammable and can be explosive. There can also be an unpleasant smell and there can be an impact on local wildlife and local property prices can be affected

Electronic waste (or e-waste) is electronic equipment that has ceased to be of use. Electronic waste includes both "white goods" such as refrigerators, washing machines, and microwave ovens and "brown goods" such as televisions, radios, computers, and mobile phones. E-waste contains complex combinations of highly toxic substances (such as lead and cadmium) that pose a danger to health and the environment, which should be treated as hazardous materials with respect to their disposal, it also contains non-recyclable parts and recoverable parts made of gold, silver, platinum, and other valuable materials, as well as recyclable materials (such as plastics and copper), that can be used to make new electronic items.

Resource recovery

Resource recovery is using wastes as a material to create new products. The aim is to reduce the amount of waste generated, thereby reducing the need for landfill space and reducing the use of raw materials in the manufacturing of new products. Plastic, paper, aluminium, glass and metal are examples of where value can be found in waste.
Resource recovery goes further than just the management of waste. Resource recovery is part of a circular economy, in which the extraction of natural resources and generation of wastes are minimised, and in which materials and products are designed more sustainably for durability, reuse, repair-ability, remanufacturing and recycling

The term **"energy recovery"** often is applied only to a narrow number of methods for converting wastes into energy but it also includes a range of technologies used to create heat, electricity, or fuel.
Energy recovery is a way to reduce waste. After recyclable materials have been removed, the remaining waste can be treated to release energy.

Design Process

Fossil fuels and the environment:

The burning of fossil fuels leads to the release of harmful products into the environment.

Carbon fuels such as wood, coal and petroleum release unburnt carbon particles into the environment. These particles are very dangerous pollutants and cause respiratory diseases for example asthma.

When fuels are incompletely burnt, they release carbon monoxide gas into the atmosphere. This gas is very dangerous as it is poisonous in nature. If we burn coal in a closed room, then the person sleeping in that room will be killed by the action of carbon monoxide.

The combustion of fossil fuels also releases a large amount of carbon dioxide into the atmosphere. Carbon dioxide is a **greenhouse gas** which is responsible for global warming. **Global warming** is a rise in the overall temperature of earth's surface. This leads to melting of polar caps and rise in the sea level and further results in flooding of coastal regions.

The burning of coal and diesel releases sulphur dioxide gas. This gas is extremely corrosive and suffocating in nature. Petrol gives off oxides of nitrogen. The oxides of sulphur and nitrogen get dissolved in rainwater and form acids. This is known as **acid rain**. This water is very harmful to plants, animals, and various monuments.

The 6 'R's

The Six Rs of sustainability help designers think about designs and designing in the following way:

RETHINK - This means that we should try to rethink our lifestyles and the way we design,make and use products.

REFUSE - This means that we should try to buy materials and products that are unsustainable.

REDUCE - This means that we should try to reduce the amount of materials and energy used to manufacture products.

REUSE - This means that we should try to reuse products (perhaps for a different?) so they don't need to be thrown away.

REPAIR - This means that we should try to repair products so they don't need to be thrown away. Products should be designed so that they can be easily maintained and repired. (This is called '**Design for maintenance**')

RECYCLE - This means that when the product cannot be reused or repaired or given to someone else to make use of, the product should be taken apart and the parts converted into other products. The problem with this is that it can use a lot of energy.

Fair Trade

The **treatment of workers** is an important consideration that Designers should be aware of.

The Fairtrade Foundation is a charity based in the United Kingdom that works to empower disadvantaged producers in developing countries by tackling injustice in conventional trade, in particular by promoting and licensing the Fairtrade Mark, a guarantee that products retailed in the



UK have been produced in accordance with internationally agreed Fairtrade standards
The organisation is an independent non-profit organisation. Its four key areas of activity include:

- Providing certification of the trade chain for products, and allowing the use of the Fairtrade Mark on products as a consumer guarantee.
- Growing demand for Fairtrade products and supporting producers to sell to traders and retailers.
- Working with partners to support producer organisations and their networks.
- Raising awareness of the need for fair trade in the public.

Questions 4U2do A

1. What is 'sustainable design' and why is it becoming increasingly important?

2. What does the term Finite mean? Give an example of a finite resource.

3. What is a Renewable resource? Give an example of a renewable resource.

4. What is Landfill? What are the problems associated with this metjhod of waste disposal?

5. What is waste recovery?

6. What is Energy recovery?

7. What are the 6Rs which are elements of sustainable design?

8. What is the carbon footprint of a product?

9. What is 'fair trade' and what do they do?

10. Find out what the following symbols mean and write them in the table

Human Needs

Human beings all have similar needs. How important these are to them depends on which of the needs have already been satisfied, the persons age, their experiences of life and cultural background.
The pyramid below atempts to show that when a person reaches a particular level in their own 'needs', the desire to achieve the next level develops.



Advertising and Marketing

In the 1960s, Professor Neil Borden at Harvard Business School identified a number of factors that influence a consumer's decision to buy a product. He identified 4 key elements: product, price, place and promotion.

Product

The product aspects of marketing deal with the specifications of the design and how these relate to the end-user's requirements. This can include 'after sales support' such as warranties, guarantees, and servicing.

Pricing

This refers to the price of the product and of it's competitors.

Placement

This refers to how the product is sold e.g. online, retail, catalogue, etc.
Also the geographic region the product is to be sold, the environment in which it is to be used/sold, and which 'demographic' or target market it is aimed at.

Promotion

This includes advertising, sales promotion, publicity, and personal selling. The needs/desires of people are investigated more in advertising than in any other business. If it is known what the target user group really strives for, and what their highest priorities in life are, it is possible to respond exactly to these using advertising. Short-term incentives to encourage buying of products such as coupons or a sale give an incentive to buy but do not build customer loyalty or encourage future repeat buys. A major drawback of sales promotion is that it is easily copied by competition and cannot be used as a sustainable source of differentiation.
Publicity involves attaining space in media, without having to pay directly for it. For example a company may have a launch for a new product covered by a newspaper or on the TV news.

Brand

A brand is a name, term, design, symbol, or other feature that distinguishes products and services from those of a competitor. A brand is more than a name or symbol- it reflects the personality of the company.

Market Pull and Technology Push

The term 'Market Pull', refers to the need/requirement for a new product or a solution to a problem, which comes from the market place. The need is identified by potential customers or market research. A product or a range of products are developed, to solve the original need.

Market pull sometimes starts with potential customers asking for improvements to existing products. Focus groups are often central to this, when testing a concept design or an existing product.

Technology Push is when research and development in new technology, drives the development of new products. Technology Push usually does not involve market research. It tends to start with a company developing an innovative technology and applying it to a product. The company then markets the product.

Entrepeneurs

An entrepreneur is a person who devises, sets up and runs a new business. Successful, well known entrepreneurs include people like Lord Alan Sugar and Sir Richard Branson.

Entrepreneurs are self-employed, but not all self-employed people are entrepreneurs.

Entrepreneurs typically:

- devise untested ideas
- make high-risk decisions that have a potentially significant long-term impact
- delegate management to experts, meaning that the company can easily continue to function without the entrepreneur's input if and when they move on
- aim to generate buyer interest in their business.

Crowdfunding

Crowdfunding is the practice of funding a project or venture by raising small amounts of money from a large number of people, typically via the Internet. Crowdfunding is a form of crowdsourcing and alternative finance.

Although similar things can be done through mail-order subscriptions, benefit events, and other methods, the term crowdfunding refers to an Internet-based activity.

The modern crowdfunding model is based on three 'parties': the project initiator who proposes the idea or project to be funded, individuals or groups who support the idea, and a moderating organization (the "platform") that brings the parties together to launch the idea.

Crowdfunding has been used to fund a wide range of for-profit, entrepreneurial ventures such as artistic and creative projects, medical expenses, travel, and community-oriented social entrepreneurship projects. Its use has also been criticised for funding fraudulent causes.

Co-operatives

A cooperative (also known as co-operative, co-op, or coop) is a group of people who unite voluntarily to meet their common economic, social, and/or cultural needs and aspirations through a jointly-owned enterprise. Co-operatives give people control of the businesses they are closest to - whether they shop at them, work at them, or supply them.

Cooperatives include:

- businesses owned and managed by the people who use their services (a consumer cooperative)
- organisations managed by the people who work there (worker cooperatives)
- multi-stakeholder cooperatives that share ownership between different stakeholder groups. For example, care cooperatives where ownership is shared between both care-givers and receivers. Stakeholders might also include investors.
- platform cooperatives that use a cooperatively owned and governed website, mobile app or a protocol to facilitate the sale of goods and services.

Cooperative businesses are typically more economically resilient than many other forms of enterprise, with twice the number of co-operatives surviving their first five years compared with other business ownership models. Cooperatives frequently have social goals which they aim to accomplish by investing a proportion of trading profits back into their communities.

Sharing ownership gives people a stake which:

- creates greater engagement, interest and concern for the long term interests of the business.
- boosts productivity by making employees and suppliers more likely to work harder to support the business.
- harnesses innovation, by giving those who understand the business best a reason to contribute to its development. When these people are also the owners there is an incentive, and a reward, for contributions.

Questions 4U2do B

11. What does the term 'Market Pull' mean? Give an example.

12. What does the term 'Technology Push' mean? Give an example.

13. What is an Entrepeneur?

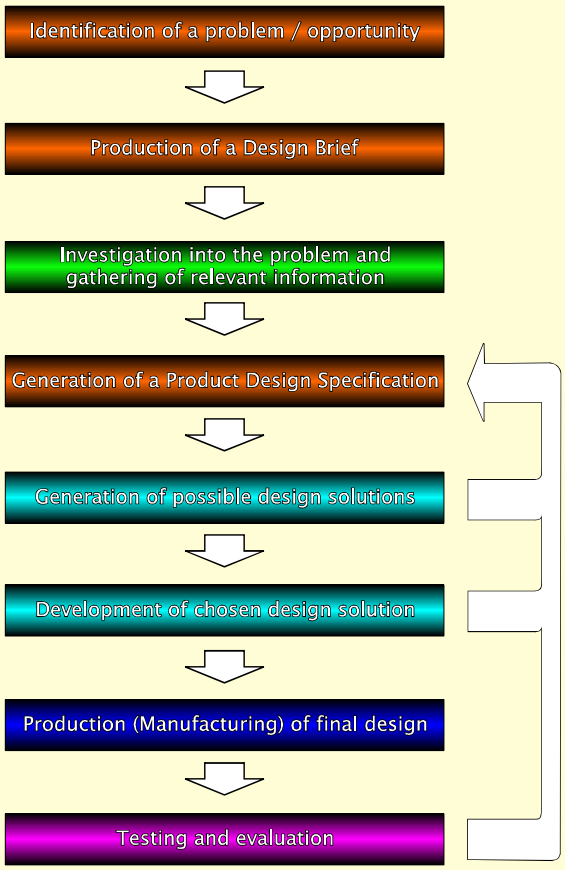
Design Process

14. What is Crowdfunding?

15. What is a Co-operative and what are the advantages of this type of business?

The Design Process

At school we tend to think of the design process as a linear process with one step following straight on from the next. However this need not always be the case and different designers work in different ways.



Iterative design

Iterative design is a design methodology based on a cyclic process of prototyping, testing, analysing, and refining a product or process. Based on the results of testing the most recent iteration of a design, changes and refinements are made. This process is intended to ultimately improve the quality and functionality of a design as successive versions, or iterations of a design are implemented

The brief.

For most professional designers their involvement starts with a briefing. This might be a very formal 'presentation' which details all aspects of the 'project' on the other hand it may be very open and informal. Whichever approach is adopted it is essential that the designers know any specific requirements that they must satisfy. In addition to details describing the product requirements, a good brief should also provide some contextual background to the company, its history, culture and markets.

The design brief is a starting point from which the unknown aspects of the product and market can be identified, researched and defined.

The Product Design Specification (Design Criteria)

The product design specification (PDS) is a document created early in the design process. It should ensure that all relevant factors are accounted for and all interested 'parties' are taken into account.

A product specification should provide precise, measurable and unambiguous detail about what the product must do, without providing unnecessary constraints or suggesting possible solutions.

The product specification not only describes the required performance of the product but also provides a baseline for the evaluation of the finished product.

The specification should distinguishing between wishes and needs, from both the company's and the users' perspectives.

The specification should not simply be a 'wish list' generated to be as challenging as possible, nor should it be a list of what you know can be achieved.

Image boards

When analysing a design context it is often helpful to produce an image board. These are an excellent way of developing understanding of some of the key issues. They are especially powerful for generating and communicating understanding about who the product is targeted at.

Collections of images can be used in a number of different ways, to represent types of user, visual values, technologies, product usage and usage scenarios. Together, these different representations can provide strong clues as to the way in which a product could be styled. A typical board should contain between 10 and 20 carefully chosen images.

Mood Board

Mood boards aims to capture the 'values' of the product which will appeal to the customer. The mood of a product is the sentiment, feeling or emotion which the product produces when it is seen - for example, soft and comforting, hard and rugged, business like or frivolous.

Style board

Styling boards presents images of products or product features which convey the intended mood. These products should be from a diverse range of markets and have different functions.

Lifestyle board

Images representing the target customers' lifestyle. The images should indicate the personal and social values and cultural trends.

Questions 4U2do C

16. How can designers use Image boards to help them?

Design Process

Modelling

Throughout the design process it is often helpful to model ideas.
Models can be used to test the aesthetics of a design, how it might function/perform, how much it would cost, its strength, aerodynamics etc.
During your DT projects you might need to make a simple pin jointed 2D cardboard model to test how two hinged parts on one of your designs would move, or a solid 3D model from Plasticine or styrofoam to see how your design might feel to hold (its ergonomics), or a computer model using CAD to see how it will look, or a mathematical model on Excel to calculate a selling price for your design.

Scale Models

A scale model is a copy of an object that is larger or smaller than the actual object. Usually scale models are smaller than the original and used as a guide to making the object in full size. Scale models are built for many reasons.

- Engineers may require scale models to test the likely performance of a design at an early stage of development without going to the full expense of producing a full-sized prototype.
- Architects may require models to evaluate the look of a new construction.
- Scale models may be used to promote new products prior to manufacturing in order to get a feel for their potential market or generate sales.

Prototypes

A prototype differs from a model in that it is intended to perform in the same way as the finished product as well as look like it. Prototypes are used to help designers test the performance of a product before starting production.
It is an important part of the design process to test, evaluate and then modify designs based on the analysis of prototypes.
Prototypes may be made from different materials to the final product due to costs but materials with similar properties should be chosen wherever possible. They may also be made using different production processes including rapid prototyping equipment such as 3D printers.
Prototypes may lack some of the fine surface details which are included in the final product.

Computer Modelling / visualisations

It is possible to model ideas on computer long before going into the workshops. Designers often produce computer renderings of their designs to see what they will look like. These images can be inserted onto 'real backgrounds' to see how the product will fit into various surroundings. Different colour combinations and materials can also be 'tested'. This type of model is largely for testing the aesthetics of the product but can also be used to check that parts 'fit' together and move as expected.
Computer models can also be used to perform mathematical calculations such as the overall weight of a design/ quantity of material required. Or to perform structural calculations to test strength / stability.
Projected sales can be modelled on a computer to calculate break-even volumes and generate profit forecasts.

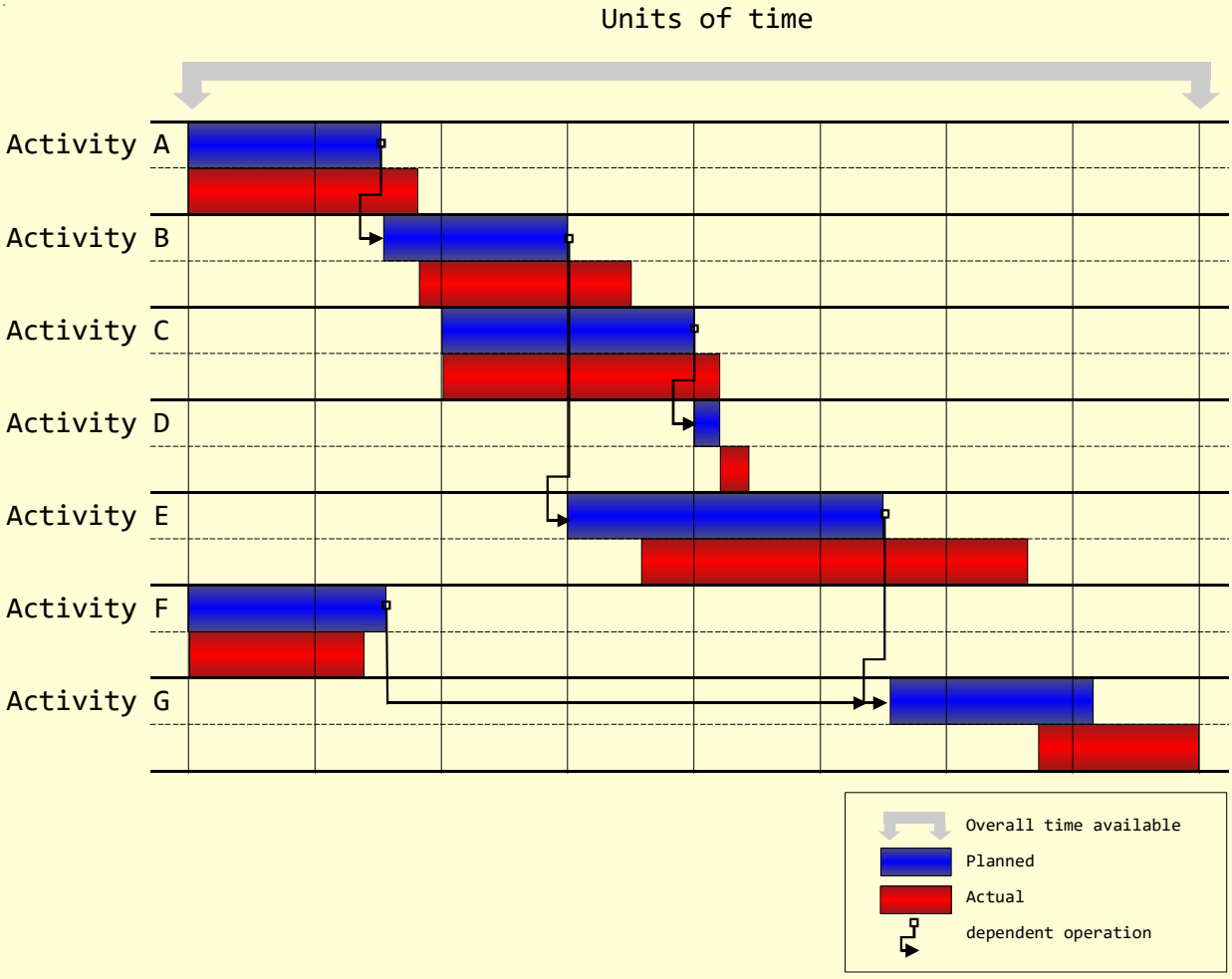
Planning.

In order to complete any design project on time and to budget careful planning is necessary.
Henry Gantt (1861-1919) was a mechanical engineer, management consultant and industry advisor. He developed Gantt charts as a means of planning/monitoring the progress of projects.

They allow you to;

- assess how long a project should take
- plan out the order in which tasks need to be carried out
- manage the dependencies between tasks
- determine the resources needed
- monitor progress.
- see when action needs to be taken in order to bring a project back on course

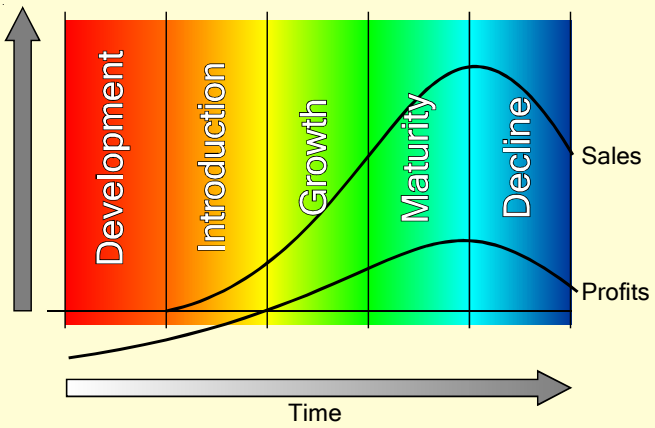
The Gantt chart is constructed with a horizontal axis representing the total time available for the project, broken down into increments (lessons, weeks, or months), a vertical axis representing the tasks that make up the project and a graph area which contains horizontal bars for each task.



Design Process

Product Life Cycle

The stages that a product goes through over time is commonly known as the "Product Life Cycle".
The classic product life cycle has five stages *(illustrated below)*:
Development; introduction; growth; maturity and decline



Development Stage

Before a design goes into production there is a development period when market research is carried out, alternative designs are explored and manufacturing systems are set up. This can all be very expensive and during this period little or no revenue is generated through sales.

Introduction Stage

At the Introduction Stage market size and growth is small. Marketing costs are high due to promotion and launch costs and it is unlikely that a company will make profit during this Stage. Sales have to be carefully monitored to ensure that they start to grow. Otherwise, the best option may be to withdraw the product.

Growth Stage

During the Growth Stage there is a rapid growth in sales. Profits rise due to an increase in output (economies of scale). At this stage significant money may be spent on promotional resources.

Maturity Stage

The Maturity Stage is the most common stage for products. It is in this stage that competition is most intense as companies fight to maintain their market share.
The Maturity Stage is the time when most profit is made.
Money spent on research and development is likely to be restricted to product modification and improvement and perhaps to improve production efficiency and quality.

Decline Stage

In the Decline Stage, the market is shrinking, reducing the overall amount of profit. At this stage it may be possible to reduce some production costs or even to transfer production to a cheaper facility, sell the product into other, cheaper markets. Care should be taken to control the amount of stocks of the product. Ultimately, depending on whether the product remains profitable, a company may decide to end the product.

Questions 4U2do D

17. How can designers use Modelling to help them?

18. Describe what you think makes a good design.

19. Give an example of a product that you think has been well designed and explain why you think it is good.

Design Process

20. Which stage in the life cycle of a product is the most profitable?

21. Why is this?

Design Protection.

Designs can be protected from being copied by copyright and patent laws.

Copyright Law

Copyright allows you to control how your work is used and how it is copied, adapted, published, performed or broadcast.
If you produce original books, webpages, computer programs, instruction manuals, artistic work, technical drawings, photographs, diagrams, maps, dramatic and musical works, sound recordings, films, videos and broadcasts, including those on cable and satellite, you automatically hold the copyright on them.
Copyright also covers the typographical arrangement or layout of publications.

You can't claim copyright for:

- names, titles, slogans or phrases - though you might be able to register these as a trade mark.
- products or industrial processes - though these may have design right or be eligible for patent protection.
- Ideas.

Copyright covers every medium in which a work exists, including the Internet.

How long copyright lasts

Copyright protection for literary, dramatic, musical and artistic works lasts until 70 years after the death of the creator. For sound recordings, broadcasts and cable programmes it lasts 50 years. Copyright for the typographical arrangement of publications lasts for 25 years.

How to copyright your work?

Copyright is automatic in the UK. Unlike some other forms of intellectual property, you don't have to apply for it and there's no register of copyright holders.
In practice, however, it can be difficult to enforce legally.
It's a good idea to mark your work with the international copyright symbol © followed by your name and the year of creation.

This can:
- have a deterrent effect on potential infringers
- help your case in any future infringement proceedings

Other ways in which you can help prove your authorship of an original work are:
- leaving a dated copy of your work with a bank or solicitor
- posting a copy of your work to yourself by special delivery and leaving the dated package unopened

Protection overseas

Under international conventions, copyright material created by UK nationals or residents is protected in many countries. Some countries insist you mark your work with the international copyright symbol © and the year your work was created but copyright isn't respected in some countries.

If you infringe copyright, you could be taken to court and run the risk of damages and compensation. Deliberate infringement of copyright on a commercial scale - can even be a criminal offence. This carries an unlimited fine and up to ten years' imprisonment.

There are occasions when you don't need permission. For example, you're allowed limited use of copyright material for:
- teaching, research or study
- criticism or reviewing
- reporting current events
- court proceedings

Patent Law

A Patent is a temporary monopoly granted to the owner of an invention which prevents anyone else from using their idea.
When a Patent is granted, a full description of the invention is made available to the
A Patent can be granted for an article, process or substance. The maximum length of a Patent is 20 years.
All applications for a Patent are subject to a search made by the Patent Office to establish whether the design is new.
If the design is produced in the normal course of an designer's work the rights for the design will normally belong to their employer.

Disclosure of Designs

A patent cannot be obtained if the design has been made known to the public at any time before the Patent Application is made. Therefore, if a Patent Application is contemplated it is essential not to disclose the design to anyone, except under conditions of strict confidence, until the application is actually made.

Costs

Obtaining patents can be expensive- usually several thousand pounds.
It is not possible to estimate exactly how much a Patent Application will cost as they will depend on the nature and complexity of the design.
Several steps have to be taken before a patent is granted, and the whole process is likely to take at least three years .

Overseas Patents

A British Patent covers only the United Kingdom. In other countries, separate Patents must be applied for.

The United Kingdom subscribes to the European Patent Convention which means that most European countries can be covered by a single patent application but this is more expensive than an ordinary British one but provided at least 3 countries are covered the cost will almost certainly be less than that of applying for separate patents in each country.

Registered Designs

A Registered Design gives a company a monopoly on the appearance of their design as applied to a particular article. This is much cheaper than to obtain a patent.

A registered design lasts initially for 5 years from application, and this term can be extended to a total of 25 years.

Design Right

Where a new design is created in the UK or Europe, any drawings, data files or prototypes should be signed and dated by the author. The original drawings and prototypes should be kept in a safe place.

Many such designs will be protectable by Design Right which may be used to prevent unauthorised copying of the design whether or not it is protected by a patent or registered design.

Questions 4U2do E

22. What is 'copyright' and how is it obtained?

23. What is a 'patent' and how long does it last?

AQA General Certificate of Secondary Education

Design and Technology: Product Design

Unit 1 Written Paper

To help you prepare for the written exam

Q. 1 Identify the source of renewable energy. [1 mark]

A Coal
B Hydro-electrical
C Natural gas
D Oil

Q. 2 A method of raising money from lots of people to launch a new design is called: [1 mark]

A co-operative
B Crowd funding
C Fair trade
D Virtual marketing

Q. 3 Which one of the following contributes to global warming? [1 mark]

A Using renewable sources of energy
B Using fossil fuels
C Improving efficiency in manufacturing
D Increasing the use of nuclear power generation

Q. 4 Identify which energy source is finite. [1 mark]

A Coal
B Solar
C Tidal
D Wind

Q. 5 Which one of the following is a feature of a product designed for maintenance? [1 mark]

A Biodegradable materials
B Complex electronics
C Planned obsolescence
D Repairable components

Q. 6 Designers often create products that they know will have a limited life span. What is this called? [1 mark]

A Design for disassembly
B Design for maintenance
C Planning for manufacture
D Planned obsolescence

Q. 7 A co-operative is [1 mark]

A a business that is owned and managed by its workers.
B a method that businesses use to trade with each other.
C an organisation that helps workers have fair trading conditions.
D a way of raising money from large numbers of people.

Q. 8 Explain why some people are opposed to the use of renewable energy sources. [2 marks]

Q. 9 Name a suitable material or system that designers might use to create a model of a design. [1 mark]

Q. 10 In 2010 the use of renewable energy in the UK accounted for 6.5% of total energy usage. By 2015 this figure had increased to 25%. Give two reasons for the increase in the use of renewable energy sources. [2 marks]

Q. 11 When discussing sustainability we refer to the six Rs. Three of the six Rs are given below. Explain the meaning of each. Reduce,Refuse, Reuse [3 x 2 marks]

Q. 12 Explain why designers create models of their designs before final manufacture. (3 marks]

Q. 13 Explain why having a design specification is important to designers and how this helps to ensure a successful outcome. [3 marks]

Q. 14 Explain the term 'planned obsolescence'. Give an example in your answer. [3 marks]

Q. 15 Explain why modelling is an important tool used by designers to develop prototypes. Give specific examples in your answer. (4 marks]

Q. 16 Designers use a variety of modelling techniques to develop their ideas. This sometimes involves working directly with materials and components in the forms below: Card modelling, Toile, Breadboard. Chose one of the modelling techniques above and circle your choice. Describe how your chosen modelling technique is used to develop products. [6 marks]

Q. 17 Designers often collaborate. Discuss the importance of collaboration in creating effective design solutions. Give examples to support your answer. [6 marks]

Q. 18 Explain why designers research and compare products from other manufacturers before starting to design new products. [6 marks]

Q. 19 The design and manufacture of products has an effect on our planet and environment. Analyse and evaluate the issues a consumer may consider before deciding to purchase products. Give examples in your answer. [8 marks]

Q. 20 Designers sometimes choose materials according to their impact on society and the environment. Examples include the use of fair trade cotton, recycled components and biodegradable packaging. Evaluate how the use of such materials might be seen as the ethical choice. [10 marks]

Exam Advice

You are very likely to have to answer questions relating to the environment so make sure you know about sustianable design.

It is also likely that you will be asked about the use of models in the design process.

For questions that carry several marks always include examples to illustrate your answer.

List of CGP Revision Questions:

A3 Product Sustainability
A4 Product Sustainability and Society
A5 Products in Society
A6 Powering Systems