

# Year 10 D&T Learning Outcomes

## Section 1 – Key Ideas in Design and Technology

### **Technology in Manufacturing**

- To understand manufacturing systems and be able to identify input, process, and output.
- Explain how advances in technology can improve manufacturing.
- Describe how different ways of manufacturing can help maximise efficiency.

### **Production Systems – CAD/CAM**

- Be able to define CAD/CAM and explain what the benefits of each are.
- Identify the different materials and processes that CAM can be used for.
- Understand how CAD helps global companies.

### **Product Sustainability**

- Be able to define sustainability and discuss why sustainable products are better for the environment.
- Understand the impact of a product's carbon footprint and why this has negative effects on the environment.
- Discuss and identify products that have been designed with planned obsolescence and the impact that this has on the environment.

### **Product Sustainability and Social Issues**

- Be able to carry out a Life Cycle Analysis of a product and discuss the social impacts this has.
- Know and be able to confidently identify the 6 Rs and where they are used.
- Discuss the Social Footprint of various designs and be able to assess the impacts that various designs or manufacturing processes may have on people.

### **Products in Society**

- Identify when a product has been developed due to technology push or market pull.
- Discuss how products can impact particular groups in society.

### **Powering Systems**

- Identify renewable and non-renewable energy sources and discuss the environmental impacts.
- Understand how energy can be stored.

## Section 2 – A Introduction to Materials and Systems

### Properties of Materials

- Understand the different properties of various materials and be able to identify when and how these are beneficial to a product.
- Understand how materials can be manipulated to enhance their properties.

### Paper, Board and Timber

- To know the different types of paper and board, and discuss their applications.
- To be able to explain how paper is manufactured.
- To be able to identify woods as either hardwood or softwood and discuss the different properties that these materials have.

### Metals, Alloys and Polymers

- Know how to identify ferrous and non-ferrous metals, and what properties they have.
- Understand the creation of alloys and how this can enhance a materials properties.
- To be able to identify and categorise plastics.

### Textiles

- Identify natural and synthetic fibres and understand their properties and application.
- Understand the 3 ways that yarns are used to make fabrics.

### Textiles and Manufactured Boards

- To understand that boards can be manufactured.
- To be able to identify at least three different manufactured boards and know their properties.

### Electronic Systems

- To be able to identify an input, process, and output.
- To understand currents in circuits and what can change them.
- To understand how microcontrollers can be programmed and identify when and where they could be used.

### Mechanical Systems

- To understand and be able to identify first, second, and third order levers.
- Understand transfer of motion, rotary motion, and reciprocal motion.

### Developments in New Materials

- Identify and analyse modern materials.
- Be able to explain how Smart Materials react to their environment.
- Identify composite materials and explain the benefits of them.

## Section 3 – More about Materials

### Selecting Materials

- To understand and consider a range of different factors when selecting an appropriate material for a job.
- Be able to justify why a material is suitable for the job that it has been selected for.

### Forces and Stresses

- Understand that forces can act on objects in different ways.
- Be able to identify five different types of forces.
- Understand and identify when materials can be reinforced, stiffened, or made more flexible to improve functionality.

### Scales of Production

- Be able to identify one-off, batch, mass, and continuous production.
- Explain why certain scales of production are selected for different products and how manufacturing techniques can influence these choices.

### Quality Control

- Understand why tolerance, accuracy, and consistency are necessary during manufacture.
- Explain a range of ways quality control checks can be carried out.
- Discuss how quality control can differ from hand manufacture to CAD/CAM.

### Production Aids

- Identify where it would be beneficial to use patterns, templates, and jigs in manufacture.
- Be able to explain why patterns, templates, and jigs improve control accuracy.

### Production of Materials

- Be able to explain how materials are extracted from a raw source and processed into a useful form.
- Understand and be able to explain the production process for paper and board.
- Understand and be able to explain the production process for timber.
- Understand and be able to explain the production process for metals (aluminium and iron specifically).
- Understand and be able to explain the production process for plastics.

### More on Production of Materials

- Be able to identify different fibre types (natural, synthetic, and regenerated).
- Discuss how material production can have an impact on the environment.

## Section 4 – Paper and Board

### Properties of Paper and Board

- Understand how the physical properties of paper and board make them more suited for certain tasks.
- Explain how the properties of paper and board can be changed, and why.
- Be able to identify the stock forms of various paper and board.

### Standard Components

- Be able to identify a range of standard components that are used with paper and board.
- Be able to justify the use of certain standard components.

### Working with Paper and Board

- Be able to identify the suitability of a range of tools used with paper and board.
- Understand when certain tools would be appropriate.
- Be able to explain how a range of tools are used with paper and board, and how to maintain safety and quality.

### Printing Techniques

- Understand and be able to identify a range of printing techniques used with paper and board.
- Discuss how certain techniques are completed and when they would be appropriate to use.

### Paper and Board Finishes

- Understand a range of finishing processes for paper and board.
- Be able to identify finishing processes for paper and board.
- Discuss how certain techniques are completed and when they would be appropriate to use.

## Section 5 – Wood, Metal and Polymers

### Uses of Woods, Metals and Polymers

- Be able to identify the properties of a material and discuss how this will affect its application.
- Discuss how the properties of materials can be modified to improve its functionality.

### Stock Forms and Standard Components

- Be able to identify a range of stock forms of wood, metals, and polymers.
- Discuss how stock forms can be selected to make manufacture easier.
- Understand and be able to identify a range of standard components and when they would be suitably used.

### More Standard Components

- Be able to discuss the difference between temporary and permanent standard components.
- Identify a range of Knock Down Fittings and discuss how they are used in manufacture.

### **Shaping materials – Hand tools**

- Identify a range of hand tools and when they would be used.
- Discuss safety precautions to take when using hand tools.
- Understand key terms such as shaping and wasting.

### **Shaping Materials - Power and Machine Tools**

- Identify a range of power and machine tools and when they would be used.
- Be able to explain how to safely use each power and machine tool.
- Discuss the safety aspects of the power and machine tools.
- Understand how the use of fences and jigs can improve accuracy when using machine and power tools.

### **Shaping Techniques**

- Identify a range of shaping techniques and discuss when it would be appropriate to use them.
- Be able to explain the process of a range of shaping techniques and discuss the positives and negatives for each.
- Understand that different materials can be shaped in different ways.

### **Moulding and Joining**

- Be able to identify a range of plastic and metal forming methods and discuss when they would be suitable to use.
- Identify when plastic and metal forming methods are used in manufactured products.
- Understand that metals can be permanently joined through soldering, brazing, and welding.
- Be able to explain metal joining processes.

### **Treatments and Finishes**

- Be able to identify a range of finishes for wood and discuss when each would be appropriate to use.
- Understand that materials can be finished to improve aesthetics or properties.
- Be able to identify a range of finishes for metals and discuss when each would be appropriate to use.