SUBJECT: Engineering	EXAM BOARD AND CODE: WJEC 603/7019/1
NUMBER OF PAPERS: 1	LENGTH OF PAPERS:
EQUIPMENT REQUIRED: Pen, calculator, pencil, ruler, rubber, sharpener	WEBSITE LINK: https://www.wjec.co.uk/qualifications/level-1-2- vocational-award-in-engineering

Describing engineering developments

Learners should know and understand how engineering developments have an impact on the design of products and structures. These include developments in:

- structural design, focusing on the development of bicycles
- mechanical design, focusing on the development of theme park rides
- electronic design, focusing on the development of mobile phone/smart technology.

Explaining the effects of engineering achievements

Learners should know and understand how the development of engineering products are impacted by changes in:

- materials
- smart technologies, including voice activated, Bluetooth and Wi-Fi
- electronic and micro-electronic components and have affected modern life, including:
- in the home
- in society.

Explaining how environmental issues affect engineering applications

Learners should know and understand how the manufacture and use of engineered products have an environmental impact in terms of:

- materials development
- costs transportation
- their use their disposal
- recycling sustainability.
- Learners should know and understand how environmental issues affect:
- engineering processes
- engineering products.

Understanding materials, their properties, and their selection for specific purposes

Learners should know and understand the following materials and their properties, and when they should be used for a specific purpose.

- Ferrous, e.g. mild steel, stainless steel, tool steel
- non-ferrous, e.g. brass, copper, aluminium
- thermoplastics, e.g. acrylic, nylon, HIPS
- thermosetting plastics, e.g. urea formaldehyde, silicon
- smart, e.g. thermochromic pigments/inks, shape memory alloy, nitinol wire
- composite, e.g. carbon fibre, Kevlar.

Describe properties required of materials for engineering products

Learners should know and understand the physical properties of materials, including their:

- tensile strength
- compressive strength
- hardness
- toughness
- malleability
- ductility
- conductivity

• corrosive resistance

• environmental degradation

• elasticity and how they can be applied in an engineering context.

Learners should know and understand the properties needed for the following engineering products:

• mobile phones

- security alarm found in the home
- bicycles
- children's play areas.

Explaining how materials are tested for properties

Learners should know and understand how destructive testing (DT) and non-destructive testing (NDT) is undertaken to determine physical properties of engineering materials, including:

- tensile strength
- hardness
- toughness
- malleability
- ductility
- conductivity
- elasticity.

Describing engineering processes

Learners should understand processes, including relevant tools and equipment, used to produce engineering products including:

- marking out
- cutting
- finishing
- preparing
- shaping
- drilling
- turning
- brazing
- joining permanent and temporary fixings
- filing
- soldering.

Describing applications of engineering processes

Learners should understand how engineering processes can be used for:

- material removal
- shaping and manipulation
- joining and assembly
- heat and chemical treatment.

Safe working practices

Learners should know and understand how to work safely when working in an engineering environment such as a school/college workshop when preparing, using and finishing materials, including by:

- carrying out a risk assessment
- identifying risks
- identifying appropriate control measures.

Using mathematical techniques for solving engineering problems

Learners should know and understand and be able to use calculations and mathematical techniques that are required to solve engineering problems, including:

- use of formulae
- Ohms law
- mechanical advantage
- velocity ratio
- areas and volumes
- measuring using datums
- estimation (of cost/materials)
- average
- scale (enlargement and reduction)
- units of measurement including:
- metric (e.g. metres, millimetres)
- imperial (e.g. feet, inches)
- time conversion (hours, minutes & seconds)
- graphs histogram, bar charts, line graph, pie charts.

Understanding and producing engineering drawings

Learners should understand the following technical details in an engineering drawing:

- section views
- construction lines
- centre lines
- hidden details
- standard conventions
- datums. Learners should be able to interpret and produce a range of engineering drawings including:
- third-angle orthographic projections
- isometric views
- sectional views that include technical details such as:
- dimension lines
- sectional lines.

Revision Tips:

- Use mind maps and flash cards
- Try making a glossary of key words to help increase confidence with the engineering terminology
- Mind maps
- Condense notes, re-write without looking
- Make a list of questions
- Use of mnemonics
- Turn information into flow diagrams
- Past exam questions
- Get someone to test you
- Exam revision meets

Exam Hints:

Read the question, answer the actual question not the one you want to answer, use of technical terms.

- Learn key words for each topic
- Learn command words (explain, identify, analyse). Do you know what the question is asking you to do?
- Read the question 3 times using **CUBE** to highlight important words in the questions **C**ircle the command word, **U**nderline keywords, **B**lock any examples, <u>then Express</u> your answer
- Check how many marks a question is worth. If, for example, a question is worth 3 marks, be sure to make 3 valid points in your answer

• Don't forget to check through your paper after you have completed the questions to ensure that you are happy with your responses