OCR
Oxford Cambridge and RSA

OCR-set Assignment

Assessment Material

OCR Level 1 / 2 Cambridge National Certificate in Principles in Engineering and Engineering Business

R103: Sustainable engineering

Set B – available from September 2020

Please note:

This OCR set assignment is to be used to provide evidence for the unit identified above. Alternatively, centres may 'tailor' or modify the assignment within permitted parameters (see Information for Teachers). It is the centre's responsibility to ensure that any modifications made to this assignment allow learners to show that they can meet all of the learning outcomes and provide sufficient opportunity for learners to demonstrate achievement across the full range of marks.

INSTRUCTIONS TO TEACHERS

The OCR administrative codes associated with this unit are:

- unit entry code R103
- certification codes Certificate J840

The qualification numbers associated with this unit are:

- unit reference number Y/505/3533
- qualification numbers Certificate [601/1273/6]

Duration: Approximately 10–12 hours

Version 2 April 2019 – Change of title to set assignment, no other changes made.
DC (CE) 208134/4 [Y/505/3533]

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Scenario for the assignment

Modern engineered products are designed for sustainability. Careful consideration of materials, manufacturing processes, energy usage, recycling and product life cycle takes place during the design phase of product development. Additionally, engineering companies will consider the location of product manufacture within the global economy, in order to ensure the most efficient and cost-effective production to remain competitive in the marketplace.

Engineering companies need to consider their environmental responsibility and the sustainability of the engineered products they produce. Consumers are now environmentally aware and will consider the environmental credentials when choosing a product. Consumers increasingly look for products that demonstrate and promote a minimised impact on the environment.

Read through all of the tasks carefully, so that you know what you will need to do to complete this assignment.

Your Tasks

Task 1 – Sustainability of engineering materials and products

Learning Outcome 1, Know about the sustainability of engineering materials and products, is assessed in this task.

Modern engineered products contain many different types of materials to make up individual components and sub-assemblies. The materials, many of which are made from finite resources, are often sourced globally. One such example product is a vacuum cleaner.

You are to investigate the engineering materials used for the component parts and main sub-assemblies of a vacuum cleaner.

Your investigation should:

- list and categorise the types of materials used within the component parts and sub-assemblies
- identify sustainability of materials used within the components and sub-assemblies
- set out the environmental considerations that affect the sustainability of the component parts and main sub-assemblies.

Task 2 – Sustainable design for engineered products

Learning Outcome 2, Know about sustainable design for engineered products, is assessed in this task.

Sustainable design is important to manufacturers of engineered products as consumers increasingly look for products which demonstrate positive approaches towards sustainability. You will use the example product in Task 1 to identify which component parts and sub-assemblies could be manufactured using recyclable and reusable materials to improve sustainability. You will produce a brief report to recommend how design of the product could be improved to incorporate sustainability in manufacture, and at the end of the product life.

You should demonstrate your ability to draw upon relevant skills/knowledge/understanding from other units you have studied in this task.

Task 3 – The impact of global manufacturing

Learning Outcome 3, Understand the impact of global manufacturing, is assessed in this task.

Global manufacturing is often used to reduce costs in the production of appliances such as vacuum cleaners.

Your task is to investigate where materials are sourced to produce appliances such as the vacuum cleaner, and produce a report that:

- identifies where materials and components are typically sourced from
- considers the impact, both positive and negative, of global manufacturing
- reflects how global manufacturing impacts on sustainability.

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Information for Teachers

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R103: Sustainable engineering

Guidance on using this assignment

1 General guidance

1.1 OCR assignments are available to download free of charge from our website: www.ocr.org.uk

1.2 OCR assignments are intended to be used for summative assessment of learners. The OCR specification gives more information on the arrangements for assessing internally assessed units.

1.3 This assignment has been designed to meet the full assessment requirements of the unit. Learners will need to take part in a planned learning programme that covers the underpinning knowledge, understanding and skills of the unit.

2 Before carrying out the assignment

2.1 Learners should be provided with a copy of the *Information for Learners* section of this assignment.

2.2 Learners will not need to carry out any preparations prior to undertaking the assessment tasks, such as collating resources to use in the assessment.

2.3 We have estimated that it will take approximately 10–12 hours to complete all tasks. Learners would need approximately 4–5 hours to complete Task 1 and approximately 3–4 hours to complete Task 2 and 2–3 hours to complete Task 3. These timings are for guidance only but should be used by the teacher to give learners an indication of how long to spend on each task. Centres can decide how the time can be allocated between each part or individual task. Centres are also permitted to spread the tasks across several sessions and therefore it is permissible for evidence to be produced over several sessions.

3 When completing the assignment and producing evidence

3.1 Each learner must produce individual and authentic evidence for each task within the assignment.

3.2 Centre staff may give support and guidance to learners. This support and guidance should focus on checking that learners understand what is expected of them and giving general feedback that enables the learner to take the initiative in making improvements, rather than detailing what amendments should be made. It is not acceptable for teachers/deliverers to provide answers, to work through answers in detail or to detail specifically what amendments should be made.

3.3 Learners may use information from any relevant source to help them with producing evidence for the tasks.

3.4 Learners must be guided on the use of information from other sources to ensure that confidentiality is maintained at all times.

3.5 Usually, the type of evidence required may be modified, with the exception of certain types of evidence listed below under '*Permitted changes*'. It is important to note that it is possible to generate the evidence in a variety of formats. Centres must advise learners as to the most appropriate format of evidence. The nature of this assessment means that learners are free to use the format that they feel is most appropriate for the purpose and target audience for each individual task (see Section 6).

4 Presentation of work for marking and moderation

4.1 Centres wishing to produce digital evidence in the form of an e-portfolio should refer to the appendix in the specification on guidance for the production of electronic assessment.

4.2 Centres may wish to discourage learners from excessive use of plastic wallets for presentation of their evidence as this may hinder the assessment process. Instead centres may wish to encourage learners to present their work so that it is easily accessible, e.g. spiral bound, stapled booklet, treasury tag.

4.3 All work must be marked against the marking criteria for the unit. Marks are allocated to learning outcomes rather than tasks. Please see Appendix B Marking criteria for centre assessment and Section 4 The centre assessed units in the specification for this qualification for more information on marking, moderation and submission of work.

5 Scope of permitted set assignment modification

The set assignment is self-contained in its present form. The set of tasks form a coherent whole addressing all the learning outcomes and allowing access to the full range of marks.

You must not change the following:

- the learning outcomes
- the marking criteria
- the requirements for supervision and authentication as described in the specification (Section 4 *The centre assessed units*)
- the maximum duration for completion of the assignment.

Permitted changes:

The set assignment can be modified in terms of the areas described below but centres must be sure that learners still have the opportunity to cover all of the learning outcomes and to access the full range of marks:

- the scenario, which can be contextualised or amended to suit local needs
- each specific task may be appropriately contextualised to match with any permitted changes you have made to the scenario.

OCR has ensured that in the language used and the tasks and scenario provided we have avoided discrimination, bias and stereotyping and support equality and diversity. In the development of qualifications and assessments we use the guidance given in the Ofqual publication *Fair access by design*, notably this includes:

- using language and layout in assessment materials that does not present barriers to learners
- using stimulus and source materials in assessment materials (where appropriate) that do not present barriers to learners.

If centres wish to modify the set assignment, we strongly advise that staff responsible for modifying the set assignment and the quality assurance of it refer to the publication *Fair access by design*.

If modifications are made to the set assignment, whether to just the scenario or to both the scenario and individual tasks, it is up to the centre to ensure that all learning outcomes can still be met and that learners can access the full range of marks.

6 Specific guidance on the task

Task 1
Learners should carry out a detailed investigation of material usage in appliances including the 6Rs. This could be through research or disassembly of a product. Learners should identify specific materials in detail within the categories of metals, polymers, ceramics and composites and the reasons for their use in the given application.

Task 2
Learners should investigate how the design of vacuum cleaners is influenced by environmental and sustainability factors through consideration of factors such as material choice and usage, energy used in manufacture, the product life cycle, and design for obsolescence and design for maintenance.

Learners should identify examples of component parts and materials that can be repaired, reused or recycled and consider the environmental impact this has.

Learners could use knowledge gained in unit R102 to relate their understanding of innovation and technical advances in engineering to sustainability.

Task 3
Learners will need to develop an understanding of global manufacturing, the reasons for global and remote manufacturing and the environmental and sustainability considerations in relation to material availability, production, transportation, finance (labour and materials), competitiveness, and ethical impacts of this approach to the manufacture of engineered products.

Total marks for assignment: 60