



Oxford Cambridge and RSA

Level 1/Level 2 Cambridge National in Engineering Design

R039 Communicating designs

Set Assignment

Scenario Title: Designing a Wireless Charger

Give to candidates on or after 1 June 2023.

Valid for assessment in the January and June 2024 assessment series only.



INSTRUCTIONS TO TEACHERS

- Read the information for teachers before delivering this set assignment.

INFORMATION

- The total mark is **60**.
- This document has **14** pages.

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Information for teachers

You **must**:

- use this set assignment for summative assessment of students.
- familiarise yourself with the Assessment Guidance relating to the tasks. This is with the unit content in Section 4 of the [Specification](#).
- read and understand **all** the rules and guidance in Section 6 of the [Specification](#) **before** your students complete and you assess the set assignments.
- make sure that completion of the set assignments and assessment fully adhere to the rules and guidance in Section 6 of the [Specification](#).
- give students the Engineering Design [Student guide to NEA assignments](#) before they start the assignments.
- allow students around 10–12 guided learning hours (GLH) to complete all tasks.
- complete the [Teacher Observation Record](#) provided on page 12 for Task 3. You **must** follow the [guidance](#) on page 13 when completing it. A Word version of this document is available to download from the Teach Cambridge website.

You **must not**:

- change or modify this assignment.
- use or modify this assignment for practice, even when the assignment is no longer valid for assessment. Sample assessment material is provided for this purpose.

Scenario for the assignment

Designing a Wireless Charger

An electronics company produces portable electrical products. As the design engineer, you have been tasked with designing a Wireless Charger unit. To ensure the design is unique, the Wireless Charger must include a secondary purpose.



The Wireless Charger should:

- consist of a moulded construction
- have a flat base to ensure good stability
- be powered by mains electricity
- be aesthetically pleasing and suit modern interiors
- include a secondary purpose (for example, charge more than one device)
- allow users to easily identify its functions
- be able to be disassembled for repair or recycling.

There is no requirement to design the circuitry.

Important Advice:

- Read through all the tasks carefully, so that you know what you will need to do to complete this assignment.
- Look at the marking criteria grids to see how the tasks will be marked. Your teacher can explain the marking criteria if you need help.
- You will need to use relevant skills/knowledge/understanding from other units you have studied in this qualification.

Your tasks and marking grids

Task 1 – Manual production of freehand sketches

Topic Area 1.1 is assessed in this task.

You are required to produce a range of design proposals for the Wireless Charger.

You **must**:

- use freehand sketching techniques to present your initial concepts for the Wireless Charger.
- use annotation and labelling techniques to explain your concepts.
- produce sketches of your design proposals using suitable methods.
- select your preferred design proposal and justify how it meets the design specification.

Total marks for Task 1: 18 marks

Advice

- Use both 2D and 3D sketching techniques.
- Include shading, tonal and texturing techniques to enhance your design work.
- Whilst annotating, aim to thoroughly explain your thoughts of each concept.

Topic Area 1: Manual production of freehand sketches

MB1: 1–4 marks	MB2: 5–8 marks	MB3: 9–12 marks
<p>Produces a limited range of creative freehand design proposals.</p> <p>Limited consideration of the design specification.</p> <p>Uses a basic range of techniques.</p>	<p>Produces an adequate range of creative freehand design proposals.</p> <p>Partial consideration of the design specification.</p> <p>Uses an adequate range of techniques.</p>	<p>Produces a wide range of creative and innovative freehand design proposals.</p> <p>Fully considers the design specification.</p> <p>Uses a comprehensive range of techniques.</p>
MB1: 1–2 marks	MB2: 3–4 marks	MB3: 5–6 marks
<p>Evidence of analysis of design proposals with limited annotation.</p> <p>Justification demonstrates limited understanding of needs and wants of the client/user.</p>	<p>Evidence of analysis of design proposals, with some annotation.</p> <p>Justification demonstrating some understanding of needs and wants of the client/user.</p>	<p>Extensive evidence of analysis of design proposals that are fully annotated.</p> <p>Justification demonstrating a detailed understanding of needs and wants of the client/user.</p>

If your work does not meet Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 2 – Manual production of freehand sketches – design development

Topic Area 1.1 is assessed in this task.

Having chosen **one** design proposal, the electronics company has asked you to present your proposal for the Wireless Charger.

You **must**:

- use freehand sketching techniques to present your developed concept for the Wireless Charger.
- use annotation and labelling techniques to explain your concept.
- produce 2D and 3D sketches of your developed concept using suitable methods.
- explain how it meets the design specification.

Total marks for Task 2: 12 marks

Advice

- Use both 2D and 3D sketching techniques.
- Include shading, tonal and texturing techniques to enhance your design work.
- Explain all of the key features using annotation and labelling.

Topic Area 1: Manual production of freehand sketches – Design Development

MB1: 1–4 marks	MB2: 5–8 marks	MB3: 9–12 marks
Produces a basic freehand sketch of design proposal.	Produces adequate freehand sketches of design proposal.	Produces comprehensive freehand sketches of design proposal.
Brief explanation of the key features of a design proposal with limited annotation.	Adequate explanation of the key features of a design proposal with some annotation.	Detailed explanation of the key features of a design proposal that is fully annotated.
Limited consideration of the design specification.	Some consideration of the design specification.	Fully considers the design specification.

If your work does not meet Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 3 – Manual production of engineering drawings

Topic Area 2.1 is assessed in this task.

The electronics company wants you to develop your selected Wireless Charger design proposal. You should use a range of engineering and assembly drawing techniques to present your design solution.

You **must**:

- produce a 3rd angle orthographic projection drawing that includes a range of dimensions.
- produce an assembly drawing that shows the main elements of your developed concept.
- use appropriate assembly drawing techniques.
- ask your teacher to complete a Teacher Observation Record for this task.

Total marks for Task 3: 12 marks

Advice

- Engineering drawings can be produced using traditional drawing methods such as drawing boards or a 2D Computer Aided Design package.
- Dimension your 3rd angle orthographic using standard conventions and scale your engineering drawing if necessary.
- Use assembly drawing techniques such as isometric and exploded views, or sectional views.

Topic Area 2: Manual production of engineering drawings

MB1: 1–4 marks	MB2: 5–8 marks	MB3: 9–12 marks
Produces a basic orthographic drawing.	Produces an adequate and accurate orthographic drawing.	Produces a comprehensive orthographic drawing.
Produces an assembly drawing that is limited in detail.	Produces an assembly drawing with some detail.	Produces a fully detailed assembly drawing.
Production of drawings is dependent upon assistance or help from other sources.	Drawings are produced with some assistance or help from other sources.	Drawings are produced independently .

If your work does not meet Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 4 – Use of Computer Aided Design (CAD)

Topic Area 3.1 is assessed in this task.

Your final design proposal needs to be modelled for the national electronics company prior to consideration for manufacture. You should use CAD methods and consider the following:

You **must**:

- use CAD to produce 3D virtual models of your design proposal.
- within your CAD drawings add rendering, textures, dimensioning and assembly views.

Total marks for Task 4: 18 marks

Advice

- Render your design with different materials.
- Show your virtual model from different viewpoints.
- Produce 3D virtual models that include multiple components as part of a CAD assembly.

Topic Area 3: Use of Computer Aided Design (CAD)

MB1: 1–6 marks	MB2: 7–12 marks	MB3: 13–18 marks
Use of CAD to produce a simple model of the design proposal.	Use of CAD to produce an adequate model of the design proposal.	Use of CAD to produce a complex model of the design proposal.
A simple 3D virtual model consisting of a very limited number of components.	An adequate 3D virtual model consisting of some components.	A detailed 3D virtual model consisting of many components.
Production of a 3D virtual model is dependent upon assistance or help from other sources.	Production of 3D virtual model is produced with some assistance or help from other sources.	3D virtual models are produced independently .

If your work does not meet Mark Band 1 criteria, you will be awarded zero marks for this task.

Marking criteria words

The tables below show the descriptor words that will be used in the Marking Criteria grids. They explain the type of evidence that you should expect to see to meet each descriptor word.

Mark Band (MB1) Words:

Word	Meaning
Basic	<ul style="list-style-type: none"> • Work includes the minimum required. It is a starting point but is simplistic and not developed. • Understanding and skills are applied in a way that partly achieves the wanted or intended result, but it would not be useable without further input or work.
Brief/Briefly	<ul style="list-style-type: none"> • Work includes a small number of relevant facts or concepts but lacks detail, contextualisation or examples.
Dependent	<ul style="list-style-type: none"> • The student can perform a task when given regular assistance or help.
Few	<ul style="list-style-type: none"> • Work produced is restricted or narrow. It includes less than half of the information or examples expected for a full response.
Inefficient	<ul style="list-style-type: none"> • Outputs are produced but with great expense or effort because of poor organisation or design and not making the best use of available resources.
Limited	<ul style="list-style-type: none"> • Work produced is restricted in range or scope and includes only some of the information required. It evidences partial rather than full understanding. • Work produced is a starting point rather than a developed process, concept or output.
Minimal	<ul style="list-style-type: none"> • Includes very little in amount or quantity required.
Simple	<ul style="list-style-type: none"> • Includes a small number of relevant parts, which are not related to each other.
Superficial	<ul style="list-style-type: none"> • Work completed lacks depth and detail.

Mark Band (MB2) Words:

Word	Meaning
Adequate(ly)	<ul style="list-style-type: none"> • Work includes the appropriate number of relevant facts or concepts but does not include the full detail, contextualisation or examples.
Assisted	<ul style="list-style-type: none"> • The student can perform a task with occasional assistance or help.
Part(ly)/Partial	<ul style="list-style-type: none"> • To some extent but not completely. • Work produced is inclusive in range and scope. It evidences a mainly developed application of understanding, performance or output needed. • Work produced results in a process, concept or output that would be useable for its purpose.
Some	<ul style="list-style-type: none"> • Work produced is inclusive but not fully comprehensive. It includes over half the information or examples expected for a full response.
Sound	<ul style="list-style-type: none"> • Valid, logical, shows the student has secured most of the relevant understanding, but points or performance are not fully developed. • Applies understanding and skills to produce the wanted or intended result in a way that would be useable.

Mark Band (MB3) Words:

Word	Meaning
Accurate(ly)	<ul style="list-style-type: none"> Acting or performing with care and precision. Correct in all details.
All	<ul style="list-style-type: none"> Work produced is fully comprehensive and wide-ranging. It includes almost all, or all the information or examples expected for a full response.
Clear(ly)	<ul style="list-style-type: none"> Focused and accurately expressed, without ambiguity.
Complex	<ul style="list-style-type: none"> Includes many relevant parts, all of which relate to each other logically.
Comprehensive(ly)	<ul style="list-style-type: none"> The work produced is complete and includes everything required to show depth and breadth of understanding. Applies the understanding and skills needed to successfully produce the wanted or intended result in a way that would be fully fit-for-purpose.
Consistent(ly)	<ul style="list-style-type: none"> A level of performance which does not vary in quality over time.
Critical	<ul style="list-style-type: none"> Objective analysis and evaluation in order to form: a judgement, evaluation of the evidence or effective trouble shooting/fault finding.
Detailed	<ul style="list-style-type: none"> Gives point by point consideration of all the key information.
Effective	<ul style="list-style-type: none"> Applies the skills required to the task and is successful in producing the desired or intended result. The work produced is effective in relation to a brief.
Efficient	<ul style="list-style-type: none"> Able to produce results or outputs with the minimum expense or effort, because of good organisation or design and making the best use of available resources.
Full(y)	<ul style="list-style-type: none"> Work produced is comprehensive in range and scope. It evidences a fully developed application of understanding, performance or output needed. Work produced results in a process, concept or output that would be fully fit-for-purpose.
Independent(ly)	<ul style="list-style-type: none"> The student can perform a task without assistance or reliance on others.
Justify/Justified	<ul style="list-style-type: none"> The reasons for doing something are explained in full.
Most(ly)	<ul style="list-style-type: none"> Includes nearly all of what is expected to be included.
Wide (ranging)	<ul style="list-style-type: none"> Includes many relevant details, examples or contexts; all of which are fully detailed, contextualised or exemplified.

Teacher Observation Record

Please read the **guidance notes** on the next page before you complete this form.

Student name:	
Qualification:	OCR Level 1/Level 2 Cambridge National in Engineering Design
Unit number and title:	Unit number: R039
	Unit title: Communicating designs
Activity observed:	Task title: Manual production of engineering drawings
	Task number: 3
Date activity completed:	
Additional evidence attached:	

TEACHER SECTION:	
<p>How did the student complete the activity? Your response must provide details of what the student did and how this relates to the relevant marking criteria.</p>	
STUDENT SECTION:	
I agree with my teacher's description of how I completed this activity.	Yes <input type="checkbox"/>
Additional student comments:	
Student's signature:	Date: (DD/MM/YYYY)
Teacher's name:	
Teacher's signature:	Date: (DD/MM/YYYY)

Teacher Observation Record Guidance notes

The class teacher and student being observed are responsible for completing this form.

The teacher uses the Teacher Observation Record to detail their observation of the student completing an activity. The completed form must give contextualised details of what the student did and how this relates to the marking criteria. Simply providing statements from the marking criteria is not acceptable. The evidence provided must be individual to the student.

The Teacher Observation Record is also used to show that the student agrees with the teacher's assessment of this activity.

The information given by the teacher must be shared with the student for the student to agree, or otherwise. If the student does not agree with the teacher's comments and links to the marking criteria, they must have the chance to talk about these further with the teacher to reach an agreed outcome **before** the work is submitted for moderation.

Both the teacher and student must sign and date the form to provide evidence of this agreement.

Additional evidence of the student completing the activity must also be provided with the form. Task 3 lists the types of additional evidence that are acceptable.

Teacher Observation Records must:

- describe what the teacher observed the student doing
- state how well the activity was completed and the reasons for this evaluation
- include confirmation from the student that they agree with the comments and reasons
- be accompanied by additional evidence as required in Task 3.

Teacher Observation Records must not:

- be a simple repeat of the grading criteria
- be completed by anyone except the teacher observing the activity and the student completing the activity
- be written by the student for the teacher to sign
- contain just a list of skills
- be used to evidence the achievement of a whole unit or task in isolation.

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