Scheme of work – R039 Communicating designs

## About this scheme of work

**Our redeveloped Cambridge National in Engineering Design J822 is for first teaching from September 2022.**

This qualification provides lots of flexibility, allowing you to find the best route to suit your centre’s needs.Our curriculum planner shows you at a high level how you could teach the course over two or three years. Our schemes of work provide examples of how you could deliver each unit, integrating the knowledge and understanding learned in the externally assessed unit.

All schemes of work should provide an opportunity for integrating the knowledge and understanding learned from the externally assessed unit content alongside the NEA assessment content. This scheme of work provides one example for delivery of this unit. You may find that a different approach would work better in your centre. We have provided a blank template should you wish to create your own or adapt one of the approaches provided.

You’ve given us lots of feedback on what you need from a scheme of work, so we’ve made sure this resource features:

* a **unit-specific** and **lesson by lesson** approach
* **simple** and **editable** Word format – or you can use our [blank template](https://www.ocr.org.uk/Images/639549-scheme-of-work-template.docx) to create your own version
* links to our [curriculum planner’s first model](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx) which is one teacher teaching the qualification over two years, broken down into half terms
* each lesson’s **key terms**
* **ideas** for teaching and learning with useful **links**
* some ‘warm up’ teaching ideas if you’re teaching over three years.

## Units and guided learning hours

**Our redeveloped Cambridge Nationals can be tailored to suit your needs – so this scheme of work and the lesson ideas are only suggestions.**

Here is a reminder of the **three mandatory units** in the redeveloped Cambridge National in Engineering Design:

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| **Unit** | **Unit title** | **Guided learning hours (GLH)** | **How are they assessed?** | **Mandatory or optional?** |
| R038 | Principles of engineering design | 48 | E | M |
| **R039** | **Communicating designs** | **36** | **NEA** | **M** |
| R040 | Design, evaluation and modelling | 36 | NEA | M |

## Assumptions

* You will adapt the SOW and lesson content to match your own timetabling arrangements and will choose how to spread the **36** GLH over the two years as best fits your needs. We have worked on the basis that the average lesson time is around **45** minutes.
* Students can access some resources outside of lessons for any online homework or extension tasks.
* You will refer to the [specification](https://www.ocr.org.uk/Images/610944-specification-cambridge-nationals-engineering-design-j822.pdf) as the key document for detailed insight into the qualification’s content and assessment requirements.

## **Summary of software/other equipment in this scheme of work**

Students will need access to suitable 3D modelling software to access TA3. To fully address the specification this software will include capacity for rendering, animation and multi part assemblies. It is possible to undertake rendering and animations using separate software and exporting 3D models. The time it takes for students to master such software will vary dramatically depending on the ability of the students and familiarity with computer design programmes.

Students will need graphic design materials to generate sketches, create accurate technical drawings and render. Typically this will include pencils, pens, pencil crayons and graphic markers though other materials may be used depending on preference.

## Week-by-week scheme of work with time allowed for working on NEA at end of delivery and practice.

NEA work could be undertaken in parallel with delivery to shorten total delivery and assessment time.
Term 1 can start when required (starts Autumn half term 2 in curriculum planner).

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|  Term 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx)**:** | **Sketching design ideas activities** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | You could begin this lesson with a discussion on the various types of drawings that exist, supported by a range of examples from artistic to 2D, 3D, technical, hand and computer rendered drawings. Introduce the unit and the makeup of each part of it.Students will learn about sketch drawing and drawing conventions and features in unit R038 and so you could use this to complement this unit.This lesson covers 3D sketches and crating. You could begin this lesson looking at existing 3D drawings and identifying the features that make them 3D.In this lesson you could:* practise sketching simple shapes in 3D. Oblique is an easy introduction into 3D drawing allowing students to draw a 2D shape and extend out
* support this by giving an example in lesson or printing examples for students to follow
* introduce students to the difference between cabinet and cavalier oblique and the difference in the resultant image
* practise crating 3D shapes – to start with you could give students exiting 3D drawings and sketch crating lines over the drawing, reducing them to basic shapes
* practise drawing using crating – give students simple objects or building block assemblies to practise drawing in 3D using crating.

Students could then use examples of thick/thin line convention to identify bold lines on their own drawings. | **Sketch****2/3 dimensions** **Pressure****Crating****Oblique** | Students will be able to sketch 3D shapes through crating.Students will be able to apply thin and thick line convention to 3D sketches. | [CSeek Free hand sketching: Its methods, instruments, principles](https://civilseek.com/free-hand-sketching/)(civilseek.com)[Oblique projection](https://technologystudent.com/despro2/obli1.htm)(technologystudent.com)[CSeek Oblique drawing, projection – its types, examples](https://civilseek.com/oblique-drawing-projection/)(civilseek.com)YouTube also contains a wide range of sketching videos with worked examples for students to follow | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 2 | .  | This lesson introduces one and two-point perspective as a second method of 3D sketching. To start you could provide completed perspective drawings and lead a discussion on the effectiveness and accuracy of them.In this lesson you could:* guide students through generating one-point and two-point perspectives sketches
* get students to practise drawing construction lines and assembling simple shapes in perspective.
 | One-point perspectiveTwo-point perspective |  | [One point perspective drawing – the ultimate guide](https://www.studentartguide.com/articles/one-point-perspective-drawing)(Studentartguide.com)[How to draw a room using a 1 point perspective step by step](https://www.youtube.com/watch?app=desktop&v=q_EEfQ_A1I8) - YouTube |  |
| 3 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | This lesson covers hue, shade and tone. You could begin this lesson with a simple 2D square; highlighting the top edges and shading the bottom to appear convex and reversing the shading to appear concave on the page. You could lead a discussion on how this effect works and what it is emulating.In this lesson you could:* use existing shaded 3D drawings for students to label the direction of the light source
* use pre drawn 3D shapes with a provided light source for students to shade sides in
* allow students to add light source and shade to their previous drawings.

To allow for the presentation of tint and well as shade, it works well to use coloured paper and white medium as well as darker/black. | **Hue** **Shade****Tint** | Specify direction of light source on a sketch.Identify darker and lighter parts of an image based on light source.Apply shade and hue to a sketch appropriately. | Blog on [What is the difference between tints, shades, hues and tones](https://creativemarket.com/blog/tint-vs-shade-hue-tone)(creativemarket.com) - contains a full definition of each and expands into colour theory[Colour basics: Hues, tints, tones and shades](https://medium.com/%40iFactoryDigital/colour-basics-hues-tints-tones-and-shades-d985221ef139)(medium.com) | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 3 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | This lesson cover adding texture to drawings. You could begin this lesson with examples of rendered textures and ask students to match them to the material they represent.In this lesson you could:* provide reference images of materials and students could replicate textures onto a flat square shapes
* ask students to draw or give them a series of oblique cube outlines and render them in a variety of materials to practise
* give students more complex 3D designs to practise adding texture to.

Materials have not been specified here and a range of mediums is possible. Pencil crayon and watercolour/alcohol markers are commonly chosen. | **Texture****Stroke****Pressure****Medium** | Students will be able to render textures to emulate the appearance of a range of common materials.Students will be able to render a 3D shape to emulate the appearance of common materials. | [Drawing time lapse: 6 different textures (YouTube)](https://www.youtube.com/watch?app=desktop&v=eXpjMBiLA2I)- a good example of what is meant by texture and worked examples[Drawing lessons: creating textures](https://blog.pencils.com/drawing-lessons-creating-textures/) (Pencils.com)is an artistic approach to mark making[Shading techniques for natural woods](https://technologystudent.com/designpro/wdshade.htm)(technologystudent.com) | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 4 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | This lesson covers labels and annotation. You could begin this lesson asking students who might use a design idea and for what purposes (e.g. client, manufacturer, customer). This could be extended to what kind of information each of those parties might require from the design.In this lesson you could:* ask students to label parts on a provided drawing
* clarify the difference between a label and annotation
* task the students with adding suitable annotations to the provided drawing for clarity
* clarify the difference between a feature and a function. Students could add annotations relating to features and functions to the provided illustration.
 | **Annotation****Label****Specification****Form****Function****Feature** | Students will be able to differentiate between a label and an annotationStudents will be able to explain what a feature is. |  | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 5 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | This lesson covers dimensions and scale. You could begin this lesson with a simple scaling up/down drawing exercise using a provided grid.In this lesson you could:* use example technical drawings as reference. Get students to write a set of rules for correct dimension arrows/lines including indicating the diameter of circular shapes
* match a selection of drawings of different sized objects to the correct scales. Suggest possible scales to draw a range of objects
* produce a scale drawing of a simple provided object from different angles.

This lesson provides some basis for dimensions and scale in isometric and orthographic drawing later in this unit too. | **Dimension****Tolerance****Diameter****Scale** | Students will be able to explain what a function is.Students will be able to produce annotations to support explanation of this function. | [CSeek Dimensioning – its types, system, principles](https://civilseek.com/dimensioning/)(civilseek.com)[Engineering drawing and sketching](http://www-mdp.eng.cam.ac.uk/web/library/enginfo/drawings/index.html) (mdp.eng.cam.ac.uk)This link has information on dimensions on types of drawings | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 6 | TA1: Manual production of freehand sketches1.1 Produce a freehand sketch of a design idea | This lesson focuses on material choice. Students will have had different levels of experience with materials up to this point so may need longer on this section.You could begin this lesson by asking students to make a list of as many considerations for material choice as possible (e.g. appearance, durability, availability etc.).In this lesson you could then:* complete a materials matchup exercise; matching materials to properties and/or applications. (A good resource detailing materials either printed or via computers may be useful for student reference)
* ask students to suggest materials for provided product parts. Extend this by asking them to record the suitable material properties and justification alongside their choice. This reinforces the previous lesson on the difference between labelling and annotation
* give students a good/better/best example of material annotation to assist in their practice labelling.

If practical facilities are available at this stage students could, time allowing, assemble their own materials reference collection and even devise their own materials tests. | **Material****Properties** | Students will be able to label material choiceStudent will be able to annotate material justification. | [How to draw textures part 2](https://www.youtube.com/watch?app=desktop&v=_8RawKZH4qQ) - YouTube[Properties of materials](https://www.ruthtrumpold.id.au/destech/?page_id=64) (ruthtrumpold.id.au)description of different performance criteria of materials[Selection of materials & working with materials - YouTube](https://www.youtube.com/watch?app=desktop&v=7mpSd9U4g5Y)(video on material selection on KS3/KS4) | R038:TA3: communicating design outcomes; Types of drawings used in engineeringR040: Students will select and justify suitable materials |

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| Term 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx)**:** | **Drawing design ideas activity** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | TA1: Manual production of freehand sketches1.2 Produce an isometric sketch for a design proposal | This lesson allows students to practise isometric drawing conventions introduced in R038. You could begin this lesson with examples of isometric and oblique drawing and asking students to identify the features that define isometric drawing.In this lesson you could:* identify the features of isometric and discuss advantages (e.g. accuracy, clarity). why it is used so widely as an industry standard
* get started with simple cubes and rectangles to develop familiarity with the grid. At first you could work directly onto isometric paper or laminate isometric paper to practise
* get students to specifically practise drawing curved and cylindrical shapes: generate a drawing of a product with a bevel and circles (e.g. phone, pen or mp3 player) to practise drawing curves and circles
* get students to produce a ‘how to’ guide on isometric, detailing angles and how to draw in preparation for the NEA.

Some students will require more support than others. This topic is particularly suited to introduction in Year 9 for familiarity. | **Isometric****Industry standard****Technical** **drawing** | Students will be able to explain the advantage of using isometric drawing convention.Students will be able to generate shapes using isometric drawing principles. | [Isometric drawing: A designer’s guide](https://www.creativebloq.com/features/isometric-drawing)(creativebloq.com)[Isometric drawing and designers](https://technologystudent.com/prddes1/drawtec2.html)(technologystudent.com) | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 2 | TA1: Manual production of freehand sketches1.2 Produce an isometric sketch for a design proposal | This lesson introduces applying thick lines and shading to isometric drawing. As an introduction you could review the shading and thick lines work done for 1.1 in oblique. You could also look at completed examples of isometric drawings and review the rules for where thick lines are used.In this lesson you could:* add thick lines to a provided isometric drawing to allow checking and consistency
* ask students to write a set of rules for when thick lines are used
* add correct shading and thick lines to their isometric drawings produced in previous activities.

This lesson could provide a good assessment opportunity to gauge individual understanding of tasks so far. |  | Students will be able to apply thick/thin line convention to isometric drawings.Students will able to add shading to isometric drawings. | [How to enhance your work, the thick thin technique -](https://www.youtube.com/watch?app=desktop&v=sDqAMKt4W3E) YouTube[Thick and thin line emphasis](https://technologystudent.com/despro_flsh/thickline1.html)(technologystudent.com) | R038:TA3: communicating design outcomes; Types of drawings used in engineering |
| 3 | TA2: Production of engineered drawings1.1 Produce a third angle orthographic projection drawing of a designproposal using standard conventions | This lesson introduces third angle orthographic layout. As a starter you could provide a completed technical drawing and labels to allow students to label the features of the drawing.In this lesson you could: * introduce engineering drawings and their importance. You could provide completed drawings for simple parts/components that they may already identify or of objects you provide
* practise third angle on building block constructs. For ease of access you could provide partially complete drawings or whiteboards to practice on
* look at and reproduce how mechanical features are represented on drawings e.g. holes, threads, countersinks
* challenge students to produce a drawing of a provided product to check for accuracy and misconceptions.
* Demonstrate how a student can extract a technical drawing from a CAD model, and then how to add the required dimensions,
* Discuss the advantage and disadvantages of drawing manual versus CAD technical drawings.

You may want to provide acetate and let students draw through an object from each angle to assist in laying out a drawing of a physical object. | **Orthographic****Third angle**  | Students will be able to describe the rules for producing an orthographic drawing.Students will be able to produce an orthographic drawing that includes mechanical features. Students will be able to use conventions of scale and dimensions orthographic drawing.Students will be able to learn how to extract a third angle orthographic drawing from a CAD model and label with dimensions.  | [Third angle projection](https://www.technia.com/blog/3rd-angle-projection/)Technia Addnode Group(technia.com)[Third angle orthographic projection](https://www.youtube.com/watch?app=desktop&v=cMRqO_yr2wA) – YouTube | R038:TA3: communicating design ideas; Working drawings |
| 4 | TA2: Production of engineered drawings1.2 Produce an assembly drawing for a design proposal | This lesson focuses on sectional view technical drawings. As an introduction, students could look at a range of cross sections and cutaway and justify the purpose of a sectional view.In this lesson you could: * provide examples of sectional view drawings including cutaway and full cross section types. Students could copy parts of these drawings and they could produce a key relating to the type of lines used in the cross sections and what they represent.
* give students a product with a case that can be opened or a model to practise drawing a cross section of.
 | **Cutaway****Cross section** | Students will be able to identify a sectional view, read a sectional drawing and understand the conventions used. | [The designer and orthographic drawing – sectional views](https://technologystudent.com/prddes1/orthogrp2.html) (technologystudent.com) shows a full cross section and how it is formed[Engineering Drawing: Sectional Views](https://edengdrawing.blogspot.com/2013/02/sectional-views.html) (edengdrawing.blogspot.com)describes all types of cross sectional drawing | R038:TA3: communicating design outcomes; Working drawings |
| 5 | TA2: Production of engineered drawings1.2 Produce an assembly drawing for a design proposal | This lesson introduces exploded view. To introduce you could present examples, highlighting similarities and how it derives from isometric.In this lesson you could:* provide a simple, easy to disassemble product for students to illustrate in exploded view e.g. a rollerball or fountain pen
* for simplicity to start with ask students to draw the object fully assembled in isometric first and then trace the parts exploded on layout paper, filling in the missing parts
* give students p­­artially drawn examples to develop familiarity.
 | **Exploded****Isometric** | Students will be able to lay out an exploded view isometric drawing. | [Exploded Views](https://www.stem.org.uk/resources/elibrary/resource/446794/exploded-views)(stem.org.uk)A range of resources on exploded views[What is exploded view drawing?](https://www.domestika.org/en/blog/4278-what-is-exploded-view-drawing)(Domestika.org)[Exploded view](https://www.youtube.com/watch?app=desktop&v=L9WBCraUTnc) – YouTube - worked example of an exploded drawing | R038:TA3: communicating design outcomes; Working drawings |
| 6 | TA2: Production of engineered drawings1.2 Produce an assembly drawing for a design proposal | This lesson introduces parts lists. As an introduction students could be presented with a range of parts list including workshop cutting lists, self-assembly furniture parts lists and parts lists for engineered products. They could discuss and list which details on the lists are most useful and appropriate.In this lesson you could:* provide students with opportunities to generate a parts list with number referencing to a diagram. This could be for a provided product or provided set of drawings to allow for checking accuracy
 | **Parts list****Cutting list****Component****Tolerance** | Students will be able to generate a parts list of at least four parts.Students will be able to number reference parts on a parts list against a diagram. | [The working drawing and parts list](https://technologystudent.com/despro_flsh/wrkdraw1.html) (technologystudent.com)[What is in a good cutting list](https://slideplayer.com/slide/9541339/)(Slideplayer.com) | R038:TA3: communicating design outcomes; Working drawings |

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| Term 3 |
| **Summary of what you will cover from the** [**curriculum planner**](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx)**:** | **Producing CAD models activity** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | TA3: Use of computer aided design (CAD)1.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes | This lesson introduces the use of CAD sketch tool features. Centres’ 3D software availability varies greatly, so there is general guidance for approach given here without specific software reference.In this lesson you could undertake activities to familiarise your students with the chosen software. To start students could practise opening and navigating existing 3D designs. In this lesson you could:* generate sketch lines and shapes using the software
* apply constraints and dimensions to those constructs
* provide a 2D technical drawing of a shape with dimensions provided for students to reproduce using circles, lines arcs
* apply constraints and dimensions to those constructs
* provide a 2D technical drawing of a shape with dimensions provided for students to reproduce using circles, lines arcs.

Students may need time to independently practise 3D modelling processes once taught. | **Constraint** | Open and navigate models in 3D software.Create shapes to specific dimensions.  | Find ‘What is CAD software – Simply Explained’ by Lucas Carolo on [all3DP.com](https://all3dp.com)Software sites:[Solidworks](https://www.solidworks.com/)[SketchUp](https://www.sketchup.com/)[Autodesk](https://www.autodesk.com/)[Onshape](https://www.onshape.com/en/)[Tinkercad](https://www.tinkercad.com/)A wide range of software is available that will allow students to complete TA3. The above represent just a sample to suit different budgets, computer specifications and tastes. |  |
| 2 | TA3: Use of computer aided design (CAD)1.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes | This lesson is a continuation of the previous. It should introduce extruding out 3D shapes and different ways of generating and controlling the shapes.In this lesson you could get students to undertake:* guided tasks to extrude 3D shapes. This could involve a short brief or a provided model to copy
* guided tasks to use other tools available to practise with more complex extrusion tools (e.g. loft and sweep functions)
* shell/hollowing activities specific to your chosen software to create shapes with hollows within them

You could provide a series of practice shapes of increasing complexity for students to attempt to replicate. | **Extrude****Loft****Sweep****Hollow** | Create 3D shapes in software. Apply a range of processes to them to modify their form. | [Solidworks beginners’ tutorial 1](https://www.youtube.com/watch?app=desktop&v=WNZEwVuGRLQ) - YouTube[Creating 3D objects by extruding 2D objects](https://knowledge.autodesk.com/support/autocad/learn-explore/caas/video/youtube/lesson/144725-courseId-100329.html)(knowledge.autodesk.com)Videos and guides are available and easily accessible for free online for all major 3D software programmes |  |
| 3 | TA3: Use of computer aided design (CAD)1.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes | This lesson should introduce students to rendering using CAD software. Depending on software used it may be necessary to begin with a tutorial on how to export a model and import it into a rendering programme.During this lesson you could:* model how to apply a texture to a simple shape
* ask students to emulate the process to create a series of shapes creating a visual library of textures available
* ask students to find textures most suitable for a provided object.

Students could:* experiment with lighting and background effects
* render images from models produced in previous lessons
* create a scene and present those images with any suitable annotations.
 | Render | Render texture and lighting effects on 3D models and export 2D images of them. | [AutoCAD rendering – basic settings – material & texture apply](https://m.youtube.com/watch?v=-6hERxYvZmc) - YouTube |  |
| 4 | TA3: Use of computer aided design (CAD)1.2 Produce 3D CAD assemblies of components | This lesson introduces the importance of multi part modelling. Most software will enable the identification and grouping of each part and the combining of several parts as one product while keeping them as separate entities.In this lesson you could:* discuss the advantage of designing a model as multiple parts and in the same studio
* model parts with relations to each other – dimensions or dependence
* practise including merging parts together and separating parts from each other
* practise bridging between two or more existing parts.

A good practice activity could be generating a casing for a simple electrical products components and batteries. | **Merge****Relative dimensions** | Set up and create a model consisting of multiple parts. | [Finally, assemblies done right](https://www.youtube.com/watch?app=desktop&v=pcwObZyixKE) - YouTube[Solidworks tutorial Parts and assemblies](https://www.youtube.com/watch?app=desktop&v=3YzMFWPw-8E) – YouTubeVideos and guides are available and easily accessible for free online for all major 3D software programmes |  |
| 5 | TA3: Use of computer aided design (CAD)1.2 Produce 3D CAD assemblies of components: | This lesson introduces the concept of generating animations as a method of presenting a 3D design.As a starter students could watch animations online from industries such as F1 racing and architecture and discuss the purpose and importance of them.In this lesson you could:* provide 3D designs for students to produce short animations of them being simply rotated or changing the zoom setting
* provide a multi part design and a guide to animate a part of it moving (e.g. scissors, gears)
* challenge students to create an animation of parts they have designed previously.

Not all 3D software has animation features. Students could export their designs to animation software or, potentially experiment with screen recording and moving their designs manually. |  |  | [CAD Animation - YouTube](https://www.youtube.com/watch?v=bHQRvvLZVsI) |  |
|  | Working on OCR-set assignment tasks any practical assessment work. In Understand the Set Assignment brief including Tasks and marking criteria.  | This lesson introduces the students to the OCR-set assignment. Time allowed for working on the OCR-set assignment is typically 10-12 hours.In this lesson you could:* introduce students to the OCR-set assignment brief and associated Tasks
* explain the marking criteria and how students will be assessed
* discuss the exact requirements for each Task
* review how to record and present evidence for assessment, especially the types of file and formats acceptable for submission.
 |  | Understand the OCR-set assignment brief including Tasks and marking criteria.Understand how to record and present evidence for assessment. | Access resources via the qualification home page including: OCR-set assignment briefs Sample assessment materials Candidate exemplarsExaminer and moderator reports (for past series – after first assessment in 2024). Note – some of the above resources will become available as the qualification develops. |  |

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| Term 4 |
| **Summary of what you will cover from the** [**curriculum planner**](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx)**:** | **OCR-set assignment** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 2 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 3 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 4 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 5 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 6 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |

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| Term 5 |
| **Summary of what you will cover from the** [**curriculum planner**](https://www.ocr.org.uk/Images/619712-curriculum-planner.docx)**:** | **OCR-set assignment** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 2 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 3 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 4 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 5 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |
| 6 | Working on OCR-set assignment tasks. | Working on Tasks continues |  |  |  |  |

## Teaching over three years

Some centres may choose to start their delivery of the qualification earlier in Year 9, and so deliver over three years. The following topic areas are suggestions of what could form part of early delivery.

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| **Topic area** | **Warm up/introductory activities** | **Length of time activity may take** |
| TA1: Manual production of freehand sketches. 1.1 Produce a freehand sketch of a design idea | Students will need time to develop independence and confidence with drawing and CAD modelling. You can guide students to undertake sketching activities when undertaking design projects. You introduce shade, hue and texture through directed design briefs.You could introduce and practise labelling design ideas and using ACCESS FM to annotate. Through theory and practical activities, you could familiarise students with a range of materials and their properties. | Students will need one to two lessons of practising 2D sketching and two to three lessons of 3D sketching methods. Most approaches revisit skills over time. Students respond to being well supported by examples.You could provide writing frames for ACCESS FM while student become familiar with how to respond to each. |
| TA1: Manual production of freehand sketches1.2 Produce an isometric sketch for a design proposal | You can plan activities to practise isometric projection and introduce thick and thin line convention alongside exiting year Key Stage 3 projects. Alternatively isometric drawing can be done on a specific design theme such as architecture or automotive design.Students will need time to familiarise and practise the convention. | One introduction lesson, three to four follow up lessons to address complex shapes, thick/thin line, shading and presentation. This could be grouped with learning about styles of technical drawing in R038. |
| TA2: Production of engineered drawings1.1 Produce a 3rd angle orthographic projection drawing of a design proposal using standard conventions | You could introduce orthographic drawings when introducing other projects. Students could undertake practical activities requiring reading of and interpreting technical drawings and cutting lists.Emphasis should be on the correct conventions required for a drawing and the technical accuracy required. | Students would need one to two lessons of direct tuition undertaking orthographic drawings to create exemplars and familiarise themselves with conventions. |
| TA3: Use of computer aided design (CAD)1.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes1.2 Produce 3D CAD assemblies of components | You could start students with simple 3D modelling activities. To create a more interactive experience this could be combined with 3D printing activities. Students could sign up to cloud based software to practice in their own time.You could set a variety of real life situations for students to create responses for. | Students would need three to four lessons of practising modelling in 3D. Once introduced, much of the time can be independent and supported by online guides or videos. Students could use cloud based 3D software for practice in their own time or for homework activities. |

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