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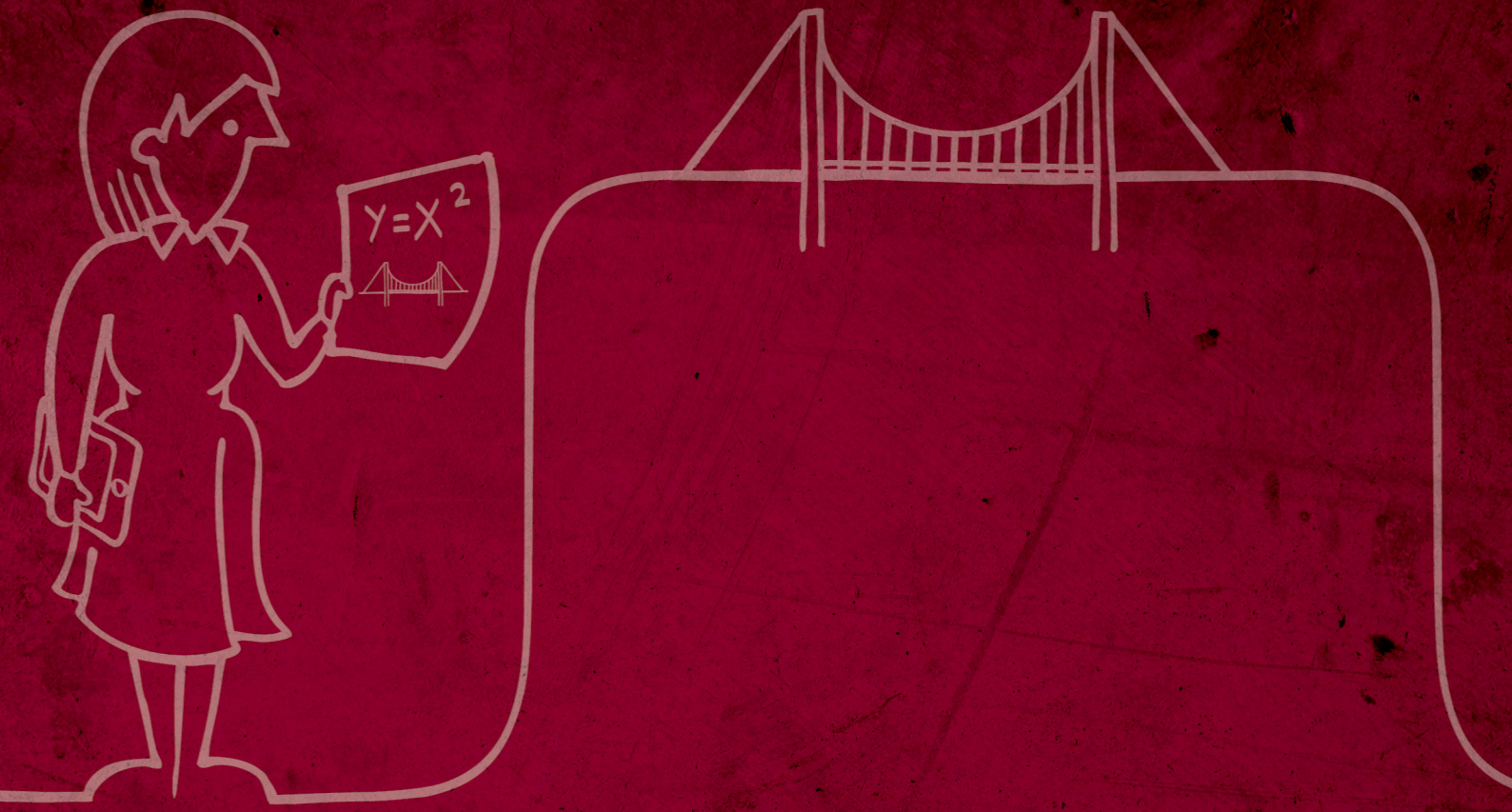

CAMBRIDGE NATIONALS IN ENGINEERING

R108 - 3D DESIGN REALISATION

DELIVERY GUIDE

VERSION 1

OCR
Oxford Cambridge and RSA

CONTENTS

To give us feedback on, or ideas feedback text the OCR resources you have used, email resourcesfeedback@ocr.org.uk

INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning objective so you can see how each activity helps you cover the specification.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resourcesfeedback@ocr.org.uk.

PLEASE NOTE

The activities suggested in this Delivery Guide MUST NOT be used for assessment purposes. (This includes the Consolidation suggested activities).

The timings for the suggested activities in this Delivery Guide DO NOT relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk.

The latest version of this Delivery Guide can be downloaded from the OCR website

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

KEY

English

Maths

UNIT R108 – 3D DESIGN REALISATION

Guided learning hours : 30

PURPOSE OF THE UNIT

This unit requires learners to apply practical skills to produce a prototype product or model using craft-based modelling materials alongside computer-controlled or rapid-prototyping processes. Learners will produce a prototype product in the form of a model and test design ideas in a practical context, to inform further development utilising more complex production processes.

Learners will evaluate the prototype making a comparison of the outcome against the product specification and evaluate potential improvements in design such as features, function, materials, aesthetics and ergonomics and make suggestions on improvements to the final product.

On completion of this unit, learners will be able to use knowledge gained to apply practical skills in the use of tools and equipment to produce a prototype.

Learning Outcome — The learner will:
LO1: Know how to plan the making of a prototype
LO2: Understand safe working practices used when making a prototype
LO3: Be able to produce a prototype
LO4: Be able to evaluate the success of a prototype

LO1 - KNOW HOW TO PLAN THE MAKING OF A PROTOTYPE

Learning Outcome — The learner will:
LO1: Know how to plan the making of a prototype

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Interpreting product specifications 	Teachers and learners will most likely adopt a practical approach throughout this entire unit, with theoretical knowledge being introduced by the teacher where necessary. Learners could begin by interpreting the requirements of a product specification in preparation for making of a prototype. The product specification could be one supplied by the teacher, or may have been developed by the learner elsewhere. Useful information about the structure of a product specification can be found on the internet with the following link explaining a typical product specification: http://www.bbc.co.uk/schools/gcsebitesize/design/resistantmaterials/designanalysisevaluationrev3.shtml Learners could also be introduced to the relationship between a product specification and the product design specification (PDS) which normally evolves from the product specification and throughout the prototyping process.	2 hours	R105 (LO1 & LO2)
2 Materials and processes 	Learners could progress from a product specification to thinking about the materials and processes they could use for making a prototype and for the actual (production) item which could be different. The following web site explains the entire process of prototype making, and could be a useful staring point: http://inventors.about.com/od/prototypes/a/prototype.htm Learners could, at this stage, begin to develop a basic plan for the making of a prototype in terms of materials and processes. This could be limited to the resources available to them.	2 hours	R106 R109
3 Planning and resources 	Planning is an important part of making a prototype, and elements of a typical plan could include resources (eg materials, component parts, cutting lists, tools/equipment, health and safety requirements, hazards and time requirements) and stages of development (eg making, process testing and evaluation). The plan could account for some or all of these. Learners could use online tools to help produce a plan. The following is a free Gantt chart tool: http://www.tomsplanner.com/ Similar tools are available for producing flow charts and tables, and this functionality is often found in many software packages. Teachers could task learners to begin developing a detailed production plan and schedule (Gantt chart) at this stage. See Lesson Element: Planning and resources.	2 hours	R110

LO2 - UNDERSTAND SAFE WORKING PRACTICES USED WHEN MAKING A PROTOTYPE

Learning Outcome — The learner will:
LO2: Understand safe working practices used when making a prototype

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Risks, hazards and risk assessment 	Teachers could further explore health and safety with learners as they produce their production plans, and when they begin work on prototype making. The identification of hazards and risks could be built into a plan, or undertaken separately as a risk assessment activity. Learners could begin to identify how risk could be mitigated, including through the use of the correct safety equipment. A useful starting point could be the Health and Safety Executive website which explains the process of risk assessment: http://www.hse.gov.uk/risk/faq.htm Teachers could develop suitable examples and task learners to develop or complete their own risk assessment activity. See Lesson Element: Risks, hazards and risk assessment.	2 hours	R109 (LO2) R110
2 Working safely and PPE 	As a follow on from producing a risk assessment, learners will have identified the need to work safety including the need to wear suitable personal protective equipment (PPE). Teachers could introduce learners to a range of PPE and task learners to explore its safe and appropriate use and storage. Learners could append this to their production plan, and also demonstrate its use during making activities.	1 hour	R110
3 Using hand tools and machines 	Before learners can undertake a prototype making activity they must be introduced to hand tools, machines and processes by which the prototype can be produced. Safe use of tools, machines and other equipment and materials will be of importance and the teacher should give suitable direction. Safe working procedures will also extend to the use of materials, chemicals, finishes and solvents. Learners could be given the opportunity to practice using tools, machines and other processes with test activities before moving onto prototype making. The use of tools, machines and processes will be further practically developed through making of a prototype.	2 hours	R110

LO3 - BE ABLE TO PRODUCE A PROTOTYPE

Learning Outcome — The learner will:
LO3: Be able to produce a prototype

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Recording prototype making 	Recording the making of a prototype is important and could include the stages of development, design changes, materials and processes etc. It could include note taking, keeping a production diary, photographing stages of production, recording of problems, technical difficulties and solutions. Learners could traditionally use a notebook for record keeping, but the teacher could introduce learners to software-based or online notebook tools for them to record the making of their prototype. The following website is one example of an online notebook tool although the teacher could find others: http://www.myschoolnotebook.com/ See Lesson Element: Recording prototype making.	2 hours	
2 Selecting materials 	Teachers could introduce learners to the range of materials available to them for the making of their prototype eg card, foam, foam board, plastics, metal and wood. Learners could begin by exploring the properties of each material and also select suitable materials for their prototype (within the limitations of how they could be processed). Selection of materials will most likely continue and change during the prototyping and testing phases.	2 hours	R109
3 Tools and processes 	Learners will probably continue to develop, with teacher guidance, practice and skill at safely using tools, machines and processes throughout prototype making. Tools and processes could be used to cut and shape materials and could include: marking out, cutting including CAD/CAM, bending, wasting, moulding and rapid prototyping.	5 hours	R110 R111
4 Preparation and assembly 	The use of preparation and assembly methods eg jigs, formers, templates, patterns, moulds, adhesives, temporary and permanent fixings will most likely be undertaken by learners in conjunction with making individual components for their prototype. Teachers could provide suitable instruction as required throughout this activity to introduce learners to the safe use of new techniques and processes.	4 hours	R110

LO4 - BE ABLE TO EVALUATE THE SUCCESS OF A PROTOTYPE

Learning Outcome — The learner will:
LO4: Be able to evaluate the success of a prototype

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Comparing prototype, plan and specification 	Once learners have completed a prototype they could develop a way of comparing or testing their prototype against the original production plan and product specification. Teachers could introduce learners to techniques or features to objectively make this comparison (eg size, weight, finish, ergonomics, function, usability etc). Learners could develop and present their comparison and evaluation in the form of a report, poster or presentation.	2 hours	R112
2 Evaluating improvements 	Evaluating improvements in both the prototype itself and the processes by which it was made could include: features, function, materials, aesthetics, ergonomics, modelling and prototyping processes, and alternative manufacturing techniques. Teachers could introduce these to learners and they could be included as part of the same presentation comparing and evaluating prototype, plan and specification.	2 hours	R112
3 Evaluating personal performance 	An evaluation of personal performance could also be included in any final presentation of the prototyping process. This could include: management of time and resources, planning and preparation, precision and accuracy achieved in making processes and quality of outcome. The following website gives guidance on how to write reflectively on personal performance: http://www.bbc.co.uk/bitesize/intermediate2/english/folio/personal_reflective_essay/revision/1/	2 hours	

POSSIBLE INTERNET SOURCES

Source	Website
BBC Bitesize	http://www.bbc.co.uk/schools/gcsebitesize
Health & Safety Executive	http://www.hse.gov.uk/risk/faq.htm
Tomsplanner	http://www.tomsplanner.com/
Myschoolnotebook	http://www.myschoolnotebook.com/

Contact us

Staff at the OCR Customer Contact Centre are available to take your call between 8am and 5.30pm, Monday to Friday.

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