Design and Technology

GCSE 2012

D&T: Product Design

Teachers' Handbook

J305

Version 1

September 2012

OCR

Contents

Introduction

OCR's GCSE in Product Design entered first teaching in September 2009.

We have improved the quality of our GCSEs for teachers and students alike. We've made improvements in two key areas: updated and relevant content and a focus on developing students' personal, learning and thinking skills.

In addition and in response to reforms announced by the Government and in response to Ofqual mandated changes to GCSEs, unitised assessment of this qualification is being replaced by linear assessment from September 2012. This means that candidates commencing a two year course from September 2012 will take all of their GCSE units at the end of the course in June 2014.

The main changes are:

- Controlled assessment and examinations will be summative

- Examinations provide opportunity for extended writing and more varied question types

- All GCSEs will meet the requirements of the Equality Act.

OCR offers a range of support materials, developed following extensive research and consultation with teachers. We've designed them to save you time when preparing for the specification and to support you while teaching them.

It is important to make the point that this Teacher Handbook plays a secondary role to the specifications themselves. The GCSE Product Design specification is the document on which assessment is based: it specifies what content and skills need to be covered. At all times therefore, the Teacher Handbook should be read in conjunction with the Specification. If clarification on a particular point is sought, then that clarification must be found in the Specification itself.

Guidance on how to use the Mark Scheme

Qualification Title: OCR GCSE in Design and Technology: Product Design J305; Unit A552 Design and Making Innovation Challenge.

A specimen mark scheme for this unit be found on the OCR website.

Development of Design Evolution through making (22 Marks)

Initial thoughts can range from predictable and worthy of one mark, to what might be considered 'wacky' or creative worthy of three or four marks. Notes, sketches and annotations can all be considered. Evidence for this can be found on page 3 of the work booklet and in additional spaces if the student has indicted so.

Design briefs should be short to the point and open enough to allow for creativity. A common mistake is for students to write a closed brief and in some cases a specification which allows no room for creative opportunity. The evidence for this can be found under 'Decision Time' on page 12 of the work booklet.

To gain the full marks available for **use/client/users** it is necessary to identify reference elsewhere in the work booklet beyond page 12. References can be found in annotations accompanying design ideas and also under 'Question Time' on page 7.

Specifications that state the obvious and include information already given or that are vague and generic should not be given more than one mark. To gain full marks for a specification it should be detailed and should clearly identify the key features of the product.

Predictable **ideas** or ones where there is limited evidence of creative thinking are worthy of one or two marks. To gain three or four marks ideas need to show detail and show clear evidence of creative thinking. To gain six marks ideas must be innovative, be creatively sustained, be fully explained and show details of construction/materials.

Where no reference to the **supplementary information** is made then no marks should be awarded. Some consideration is worthy of one mark, a more positive response especially where it is reflected in the design work can be rewarded with two or three marks. To gain the full five marks the information must be fully incorporated into the design and must demonstrate innovation and creativity.

Communicating information through sketches, writing and photographs (10 marks)

Sketches and images and written communication should be considered in their own right. Both can gain up to four marks each. Limited evidence should be given at least one mark. To gain the final two marks in this section evidence should include rendering, swatches, overlays etc and should be used extensively throughout the work booklet.

Materials, Components, Processes, Techniques, and Industrial practice (12 Marks)

Evidence for **material selection** can be found on page nine of the work booklet (Your Model) as well as in the photographs and references made with any notes or labels supporting the sketches or design ideas. Up to two marks may be awarded here.

Use of materials will range from basic constructions (one mark) to adept and creative use (two or three marks).

Making skills will include models that are poorly made or incomplete (one mark). Models, which show evidence of a reasonable standard of making skills and that are completed, are worthy of two marks. Models that are complete with a good standard of making skills and accuracy should be rewarded with three marks. To gain four marks models need to be completed to a high standard. To gain six marks models should accurately reflect the design and should demonstrate a range of techniques and complexity.

Analysis of ideas, models and prototypes (12 Marks)

Where **analysis and evaluation** is limited and/or confined to boxes 18, 19 and 20 on page 11 of the work booklet it is only worthy of one mark. Where the response is satisfactory and evident throughout the design work as well as boxes 18, 19 and 20 then this should be rewarded with two marks. Good analysis and evaluation along with justification and clear information about the future product (Fast Forward Box page 11) should be rewarded with three marks. To gain four marks evidence of a detailed analysis and evaluation with justification combined with suggested improvements and the use of technical terminology needs to be shown.

Clear plan for **reflect and record** (one mark). Records peer feedback and possible modifications (one mark). To gain both marks box 9 (Reflect and Record) and box 10 (Green Zone) on page 7 of the work booklet must be completed.

Evidence for the **development of ideas** can be found, but not confined to) page 7 of the work booklet (one mark) where thoughts have been expanded two marks may be given. Clear development of ideas and discrimination between good and poor ideas are worthy of a further two marks. Rejection of ideas in preference to ones suitable for further development and where there are no outstanding design issues having developed their ideas should gain up to six marks.

Where the reflection consists of basic comments or observations are worth one mark. Two further marks can be gained for identifying specific strengths and weaknesses (one mark) and suggesting alterations or improvements to the design (one mark). To gain the full four marks the reflection needs to include quality analysis with creative design improvements suggested.

Notes and sketches can be used for the reflection. Where students refer to the process they have been through this should not be rewarded.

The following items can be downloaded from the OCR website at www.ocr.org.uk

Specimen assessment materials - Unit A552 - Teacher script

The teacher script contains details of timings, organisational instructions, what must be said to the candidates and what the teacher can say in their own words for purposes of clarity.

Specimen assessment materials - Unit A552

This consists of the following:

- specimen of the pre release material outlining the topic of the challenge

- specimen of the examination paper which would be opened on the day of the examination stating the supplementary information relating to the challenge

- specimen copy of the candidate work booklet

- specimen mark scheme.

Candidate work booklet and the use of 'additional space'

When preparing candidates for the test they should be encouraged to make use of the additional space available in the booklet. This allows them to use their notes and sketches to thoroughly develop their thoughts and ideas. In order to access the higher marks it is important that candidates include written analysis throughout the booklet rather than just the evaluation page.

The focus of the 'Time to Reflect' session

The reflection should focus on design issues rather than the process. Failure to achieve high marks in this section is due to focussing purely on the modelling process. To access the higher marks available students must clearly identify design problems based upon their testing of the prototype and make suggestions for altering and improving the design. These alterations can be shown through the use of text and drawing.

Attaching photographs in the work booklet

Care should be taken not to stick pages of the work booklet together.

Resources

A resource list for teachers

Abbott, EA and Mansfield, ED (1995) *A Primer of Greek Grammar* Bristol Classical Press 0715612581

Design and Technology.   Product Design - Making, Testing and Marketing Unit A553

For inspiration:

Harper Design International *Product Design Now* ISBN-10: 0060859652

Laurence King Publishing *1000 New Designs and Where to Find Them: A 21st-Century Sourcebook* ISBN-10: 1856694666

Rockport publications *Design Secrets: Products* ISBN 1-56496-476-0

Brown Ref Group *Classics of design* ISBN 1 84044 101 1

Rolovision *Designs of the times* ISBN 12 88046 816 7

Cassell *The Dream catalog* ISBN 0 304 35903 3

Weidenfield & Nicolson *Century Makers* ISBN 0 297 82435 X

(Alessi) Konemann *The Dream Factory* ISBN 3 8290 1377 9

Useful Websites

www.technologystudent.com

www.designandtech.com

www.design-technology.info

www.design-technology.org

www.lboro.ac.uk/departments/cd

www.ergonomics4schools.com

www.designmuseum.org

www.coolest-gadgets.com

http://en.wikipedia.org/wiki/Famous_industrial_designers

http://directory.designer.am/

http://www.flos.com

http://www.designdirectory.co.uk/ind.htm

For technical knowledge and course understanding:

Thames & Hudson Ltd *The Eco-Design Handbook: A Complete Sourcebook for the Home and Office* ISBN-10: 0500285217

Quadrille Publishing Ltd *Eco: An Essential Sourcebook for Environmentally Friendly Design and Decoration* ISBN-10: 1844001083

RotoVision *Materials for Inspirational Design* ISBN-10: 2940361509

Laurence King Publishing *Making it: Manufacturing Techniques for Product Design* ISBN-10: 1856695069

Crowood press *Model making. Materials and Methods* ISBN 878 1 84787 0176

Oxford Uni Press *Product Modelling* ISBN 13 978 0198327615

Rotovision *Materials* ISBN 978 2 940361 50 2

Many of the resources/materials referred to below can be found on the OCR website - www.ocr.org.uk

- Specimen assessment materials (specimen challenge, specimen candidate booklet, specimen mark scheme and teacher script) can be found on the OCR website. Four different challenges based on the theme of School Sports Day are included to provide opportunities for students working in different material areas.

- The examiners report can be found on the OCR website. Reports contain a section relating to this unit and should be seen as an essential tool for teachers who are preparing students to take the Innovation Challenge exam.

- On the day of the test access is needed to a design room, studio or workshop. Equipment and materials normally associated with the teaching of design and technology should be available. However, it should be remembered that the emphasis is on using modelling materials.

- A handling collection consisting of products relating to the theme and images (PowerPoint presentation on a loop for example) and video if available is required for the actual test.

- A collection of inspirational products, linked to the theme, which show products with interesting features or capabilities needs to be available for the test.

- Drawing and communicating media and easy-to-handle modelling materials. For example, depending upon the activity, choices could include paper, card, thin plastics, fabric, wire, foil, thin metal sheet, clay, polymorph, foam board, food ingredients, components, gaffer tape and other joining methods and devices.

- Digital camera and access to a colour printer capable of producing good quality prints.

- Pre-release material outlining the themes will be sent to centres in advance of the examination. OCR will provide the teacher script, supplementary information and answer booklets for the day of the examination.

GCSE Design and Technology: Product Design J305 (Full Course) J045 (Short Course)

Inspiration:

www.productdesignlab.co.uk - Product design and development consultancy specialising in developing innovative consumer products. Website includes case studies for inspirational products that meet a specific need and design opportunity.

www.seymourpowell.com - Product design and development consultancy specialising in developing familiar and innovative consumer products. Website includes access to case studies for everyday inspirational products.

www.huddersfield3d.co.uk - Student gallery from the University of Huddersfield. An online student web gallery and information centre. You can browse hundred of items of design work as well as link to relevant web sites.

www.designcouncil.org.uk - Official website for National Strategic body of design. Helping people do what they do, better. Good source for information and up to date information on Product Design concepts, ideas and thinking.
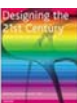
Information:

 D Norman, The MIT Press, 1998 *The Design of Everyday Things* ISBN 0262640376

 C McDermott, Rotovision 1999 *The Product Book* ISBN 2880463947

 G Marcus, Harry N Abrams *What is Design Today?* ISBN 810990814

 C & P Fiell, Taschen *Designing for the 21st Century* ISBN 3822858838

Quality websites for students:

www.designandtech.com - Modern up to date website that covers a range of material areas, providing information and inspiration for students.

www.msn.com - Click Tech and Gadgets tab for up to date information on Product Design developments and innovative and inspirational technology. Archive of articles very useful.

www.ergonomics4schools.com - promotes the teaching and learning of ergonomics.

www.coolest-gadgets.com - examples and links to innovative products.

Other forms of Support

In order to help you implement the new GCSE Design and Technology Product Design Specification effectively, OCR offers a comprehensive package of support. This includes:

Published Resources

OCR offers centres a wealth of quality published support with a fantastic choice of 'Official Publisher Partner' and 'Approved Publication' resources, all endorsed by OCR for use with OCR specifications.

Publisher partners

OCR works in close collaboration with three Publisher Partners; Hodder Education, Heinemann and Oxford University Press (OUP) to ensure centres have access to:

- Better published support, available when you need it, tailored to OCR specifications

- Quality resources produced in consultation with OCR subject teams, which are linked to OCR's teacher support materials

- More resources for specifications with lower candidate entries

- Materials that are subject to a thorough quality assurance process to achieve endorsement

Hodder Education is the publisher partner for OCR GCSE Design and Technology: Product Design.

Hodder Education has produced the following resources for OCR GCSE Design and Technology: Product Design.

OCR Product Design for GCSE Student's Book
Philip Clarke, Geoff Hancock, Austin Strickland, Editor: Bob White
ISBN: 978 0340 98200 6
29/05/2009.

OCR Design and Technology for GCSE Dynamic Learning Network Edition CD-ROM
ISBN: 978 0340 98203 7
(Available April 2009).

Approved publications

OCR still endorses other publisher materials, which undergo a thorough quality assurance process to achieve endorsement. By offering a choice of endorsed materials, centres can be assured of quality support for all OCR qualifications.

Endorsement

OCR endorses a range of publisher materials to provide quality support for centres delivering its qualifications. You can be confident that materials branded with OCR's "Official Publishing Partner" or "Approved publication" logos have undergone a thorough quality assurance process to achieve endorsement. All responsibility for the content of the publisher's materials rests with the publisher.

These endorsements do not mean that the materials are the only suitable resources available or necessary to achieve an OCR qualification. Any resource lists which are produced by OCR shall include a range of appropriate texts.

Professional Development

The 2012-13 OCR Professional Development Programme offers more accessible and more cost effective training, with the same valued content that you expect from us.

At OCR, we are constantly looking for ways in which we can improve the support we offer to teachers. Most recently we have been considering the increasing challenges that schools face in releasing teachers for INSET, and how OCR can make its professional development programme more accessible and convenient for all.

From September 2012, our new improved programme will include:

- FREE online professional development units available when and where you want them
- FREE live web broadcasts of professional development events
- FREE face to face training for GCSE controlled assessment and GCE coursework
- A series of 'not to be missed' premier professional development events.

For more information, please email training@ocr.org.uk or visit www.ocr.org.uk/training.

OCR Social

Visit our social media site (http://www.social.ocr.org.uk). By registering you will have free access to a dedicated platform where teachers can engage with each other - and OCR - to share best practice, offer guidance and access a range of support materials produced by other teachers; such as lesson plans, presentations, videos and links to other helpful sites.

Interchange

OCR Interchange has been developed to help you to carry out day to day administration functions online, quickly and easily. The site allows you to register and enter candidates online. In addition, you can gain immediate and free access to candidate information at your convenience. Sign up at https://interchange.ocr.org.uk

Frequently Asked Questions

Unit A551 Developing and Applying Design Skills

How long should candidates spend on Unit A551 work?

Centres are advised that candidate work submitted for this unit should represent no more than 20 hours for both the Full Course and Short Course option of entry.

How is Unit A551 graded and assessed?

Unit A551 is part of the a short course and full course Work is internally assess and awarded in line with the marking criteria against assessment objectives 1, 2 and 3. A sample of work is selected for external moderation.

Should all candidates submit A551 work if they are on a Short of Full Course?

Yes. Unit A551 is mandatory for the short and full course.

Can a candidate use a mixture of both electronic and paper based portfolios to submit Unit A551 work?

No. Centres are advised that single candidates should be entered for either a repository (A551/01) OR an postal (A551/02) .

Can pupils change how they present their work after being entered?

No. Candidates are entered for either a repository (A551/01) or postal (A551/02) this is the registered entry for June examination

Should Unit A551 be attempted before A553 as part of the Full Course J305?

Product Design enables flexibility in the creative delivery and organisation of each unit: A551, A552, A553 and A554 for the Full Course You can take Unit A553 before Unit A551.However, you must observe the Liner terminal rule

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Does work completed as part of Unit A551 need to then follow the same theme onto Unit A553?

Each unit separate in terms of examination entry. Unit A551 and Unit A553 do not need to follow the same theme on this linear framework. The focus for each unit can be totally unique.

Are there any project choices candidates should avoid for Unit A551?

There are themes for Unit A551 the specification for use as a starting point. These are available for adaptation to develop individual creativity and innovation amongst candidates.

Careful choice of projects will enable the most effective response to the Internal Assessment objectives. Projects considered unsuitable, restrictive and too general will deprobe candidate the opportunity to access higher marks .

Do candidates have to produce a working product?

Candidates are required to demonstrate their ideas through the use of modelling and should use a wide variety of communication methods.. Candidates should be encouraged to use a number of different materials, fabrics, ingredients or components to explore and develop their ideas

Is there a particular material focus for Unit A551?

Candidates should be encouraged to explore a range materials that support their ideas. Resources, tools, equipment and facilities should form part of a typical Design and Technology department. Material areas should include Electronics, Food, Graphics, Resistant Materials and Textiles.

Will candidates be able to re-enter units?

Yes. Controlled assessment units can be carried forward with the moderator mark from one session to the next i.e. June 2014 to June 2015. There is a separate 'carry over' code to re-enter the unit.

Unit A552 Design and Making Innovation Challenge

Where does unit A552 fit in?

Unit A552 is mandatory for both the short course (J045) and the full course (J305). For the short course, Unit A552 needs to be combined with Unit A551.

Where should the test take place?

Unit A552 should take place in a design room, studio or workshop under examination conditions (not the centre's examination room/hall). It should be noted that the 'Time to Reflect' session is taken in the centre's examination room/hall under examination conditions. This should be completed during the period 24 hours after and within 72 hours of the completion of the challenge.

How should the test be supervised?

The centre should provide an invigilator to ensure the proper conduct of the examination including starting and ending the sessions. A teaching colleague needs to be available to facilitate access to materials, monitor health and safety and read the teacher script to candidates. A technician can also provide support as a facilitator and to assist with photographs. No advice must be given to

candidates about the design or manufacture of their product or cut materials to correct shape or dimensions.

Can a break be built into the exam session?

A break of approximately 15 minutes is suggested.

Do centres need to inform OCR when they plan for the test to take place?

Centres are required to submit details of the dates of the innovation challenge to OCR using the VAF form. The form can be obtained from the OCR website.

How is Unit A552 assessed?

This unit is externally examined.

Are the timings stated in the teacher script flexible?

It is the responsibility of the centre to ensure that arrangements are in place to ensure that the timings are adhered to.

What materials can be used for the Innovation Challenge exam?

Suitable materials can include foam, foam board, card, balsa, modelling clay, mechanism kits, polymorph, polypropylene, etc.

What materials should be avoided?

Materials such as pine, MDF, plywood and acrylic sheet are not appropriate.

What writing and drawing equipment is needed for the examination?

Candidates need to use a black or blue pen for written responses. Drawings need to be done using a sharp pencil which isn't too hard. Pencil crayons can be used for rendering as well as other recognised means of enhancing drawings. Candidates should be encouraged to write legibly.

What is required for the Handling collection and Inspirational Table?

The 'handling collection', may consist of existing products or pictures, video, etc relating to the theme, and an 'inspirational table' which shows examples of products with interesting features or capabilities. It is useful to build up a bank of resources over time.

How many photographs are needed?

Four "teacher" photographs is the minimum required. Additional photos can be added to the workbook. This is particularly important if it is necessary to show other parts or views of an artefact to fully illustrate the final outcome.

What size and quality should photographs be?

It is important that colour images of a good quality are provided. Photographs should be of an appropriate size to fit into the space provided. The addition of a card with the candidates name within the photo aids the return of photos to students.

Is it advisable to run a full scale 'mock' Innovation Challenge?

This is up to the individual school. However, the challenge can lose its 'sparkle' if it is over rehearsed. Schools may find it more practical to focus on a particular element of the Challenge in order to give their students some idea of what to expect.

Will the themes change?

The themes supplied in the pre release material will change over time. The supplementary information to be considered along with the theme will be different for each sitting of the exam. Supplementary information will be supplied on the day of the examination.

Will candidates be able to re-enter units?

Yes. Controlled assessment units can be carried forward with the moderator mark from one session to the next i.e. June 2014 to June 2015. There is a separate 'carry over' code to re-enter the unit.

Unit A553 Making, testing and marketing products

How long should candidates spend on Unit A553 work?

Centres are advised that candidate work submitted for this unit should represent no more than 20 hours.

Should all candidates submit A553 work if they are on a Short Course?

A553 is a mandatory Controlled Assessment that only forms part of the GCSE.

Can a candidate use a mixture of both electronic and paper based portfolios to submit Unit A553 work?

Candidates should be entered for either OCR repository (A553/01) OR postal (A553/02) Work should not be submitted as a combination between these options. Postal submissions can be paper or CD but not a combination of each for a single candidate.

Can you make a model for Unit A553?

The product has to be a working prototype that can be evaluated in context.

Do candidates have to produce a working product?

The product must be completed to a high quality and function as intended. The product should have working features that allows it to be tested in context.

Is there a particular material focus for Unit A553?

Candidates should be encouraged to explore a range materials that support their ideas. Resources, tools, equipment and facilities should form part of a typical Design and Technology department. Material areas should include Electronics, Food, Graphics, Resistant Materials and Textiles.

It is allowed that staff may take the photos for Unit A553?

Candidates should take ownership of their own work, explaining in detail the techniques and processes they have undertaken to construct the product. The final images of the finished product should be **annotated**, showing the quality of the product.

Where is the starting point for A553?

You can start from anywhere for A553, that is the attraction. It could be from A551 or A552. It could even to continue from a KS3 project. Any product candidates have seen and would like to have a go at making.

Will candidates be able to re-enter units?

Yes. Controlled assessment units can be carried forward with the moderator mark from one session to the next i.e. June 2014 to June 2015. There is a separate 'carry over' code to re-enter the unit.

Unit A554 Design influences

What is the difference between ergonomics and anthropometrics?

The answer is that they are two entirely different but related disciplines.

In many ways, ergonomics can be considered as 'Human centred designing'.
The word Ergonomics was formed in 1949 after a government adviser joined to two ancient Greek words **ergo** (work) with **nomos** (laws). Ergonomics is a study of how to make humans work more efficiently in their environments. It is therefore in essence work study, (formerly known in industry as time and motion studies).

In order to apply ergonomics to products that interact with humans, designers need to draw upon the tables of human measurement (anthropometric tables). The word anthro comes from the Greek word for human and obviously metrics means measurement, thus, human measurement.

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