

AS and A level  
**Design  
and  
Technology**  
(Product Design)  
2017





# Agenda

- A level reforms
- Our approach
  - Design and development
- Our specifications:
  - Assessment models and objectives
  - Subject content
  - Sample question paper examples
  - NEA
- Support and next steps



# The A level reforms

- All new AS and A levels will be assessed at the same standard as they are currently
- All new AS and A levels will be fully linear
- AS levels will be stand-alone qualifications
- The content of the AS level can be a sub-set of the A level content to allow co-teachability, but marks achieved in the AS will not count towards the A level



# AS and A level Timeline

	2016	2017	2018	2019
Current specification	Summer series as normal	Summer series as normal	Final AS resit and A2 exams	
New 2017 specification		First teaching of 1 year AS and 2 year A level	First AS level assessment	First A level assessment

- The last available assessment for the current AS and A levels be June 2018
- The reformed AS first assessment is 2018 and A level is 2019



# Subject Content

The Subject Content for Design and Technology has been put together by the DfE, which worked with major stakeholders including Dyson, the Design and Technology Association (DATA) and the Royal Academy of Engineering.

The content is split into 3 sections:

- Core technical principles (AS and A level)
- Core design and making principles (AS and A level)
- Specialist knowledge (AS and A level)

**All** specifications have to include **all** content to be accredited



# Endorsements

Awarding organisations can no longer offer a choice of several different titles such as RMT/Graphics/Textiles

There are only 3 possible endorsements

- Product design
- Fashion and textiles
- Design engineering

Boards can choose which, and how many of these to offer.



# Mathematics and science content

The AS and A level subject content has a new requirement to include maths and science knowledge, skills and understanding.

- At least 15% of the written examination must assess mathematical skills
- The level of maths content is higher tier GCSE Maths

Maths and Science content is listed in Appendix 1 in the DfE Subject Content (next slide)



# Mathematical skills

The requirements:

- a) Confident use of number and percentages
- b) Use of ratios
- c) Calculation of surface areas and/or volumes
- d) Use of trigonometry
- e) Construction, use and/or analysis of graphs and charts
- f) Use of coordinates and geometry
- g) Use of statistics and probability as a measure of likelihood



# Science skills

The requirements:

- a) Use scientific laws - Newton's laws of motion, Hooke's law, Ohm's law as appropriate to the designed product
- b) Describe the conditions which cause degradation
- c) Know the physical properties of materials and explain how these are related to their uses



# Non-examined Assessment (NEA)

Coursework is now known as **Non-Examined Assessment**

There has been a reduction in weighting:

- from 60% to 50% of the qualification

All students need to produce a design and make project

## A level

- a final prototype(s) based on a design brief developed by the Learner

## AS

- a design brief developed in response to a contextual challenge set by the awarding organisation, and a final prototype(s) based on that design brief

*More later -*



# Current Assessment Objectives

Students must:		% in GCE A Level/AS
A01	Learners should demonstrate specific knowledge and understanding and be able to apply that knowledge and understanding in combination with appropriate skills in their designing, and should communicate ideas and outcomes and demonstrate strategies for evaluation	40-60
A02	Learners should be able to demonstrate and apply skills, knowledge and understanding of relevant materials, processes and techniques, and use materials and equipment to produce suitable and appropriate outcomes, and should communicate ideas and outcomes and demonstrate strategies for evaluation	40-60
	To total	100

***This has now changed to -***



# Assessment Objectives

Students must:		% in GCE A Level/AS
A01	Identify, investigate and outline design possibilities to address needs and wants	10-15
A02	Design and make prototypes that are fit for purpose	20-25
A03	Analyse and evaluate: <ul style="list-style-type: none"><li>• design decisions and outcomes, including for prototypes made by themselves and others</li><li>• wider issues in design and technology</li></ul>	20-25
A04	Demonstrate and apply knowledge and understanding of: <ul style="list-style-type: none"><li>• technical principles</li><li>• design and making principles</li></ul>	35-40
	To total	100

***For first teaching 2017***

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Our approach to Design and  
Development



## Our approach

Our approach to design and development of specifications is to:

- Review our existing qualifications
  - What works well?
  - What need improving?
- Review other offerings
  - UK and international
- Liaise regularly with stakeholders
- Use subject specialists during development



## Our research

Several telephone surveys with teachers were conducted as we developed the qualifications

- This included testing assessment models

We held meetings with the External Subject Advisory Group (ESAG)

Teachers, Higher Education

We worked with subject associates, e.g.

DATA



# Our findings

Students who take D&T like making things

- Retain this focus, despite the reduction in NEA weighting

Our teachers like the graphics route

- Retain that option within the subject content

Concern about maths content

- Questions in context

Co-teachability

- Teach AS content in Year 1, additional A level content in Year 2
- AS NEA can be a useful practical exercise for A level

Extended writing questions should be used only when appropriate



# Our design principles

- Emphasise creativity in design
- Maintain a graphics route
- Embed mathematical and science content in context
- Include clear progression
  - GCSE to A level to FE/HE/Apprenticeship/Employment
- Remember that students like 'making'



# Inspiring innovative design

- Equipping students with design skills for the future
- Encourages creativity and innovation
- Clear routes through the specification
- Progression from GCSE and beyond to HE/Careers
- Support with new content

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Edexcel Specification(s)



## Our endorsement

We have chosen to only offer Product Design and we have designed this to include a way through with a graphics product.

We will indicate where this is in the content and assessment as we go through the specifications



# Specification overview

In this section we will cover:

- Our endorsement
- A level
  - Assessment models and objectives
  - Subject content
  - Sample question paper examples
  - NEA
- AS
  - Assessment models and objectives
  - Subject content
  - Sample question paper examples
  - NEA

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A level specification





# A level assessment overview

<b>Component 1: Principles of Design and Technology</b>	<b>Component 2: Independent Design and Make Project</b>
<ul style="list-style-type: none"><li>• Written exam, externally assessed</li><li>• 2 hours 30 minutes</li><li>• 50% of qualification</li><li>• 120 marks</li></ul>	<ul style="list-style-type: none"><li>• Non-examined assessment, internally assessed and externally moderated</li><li>• 50% of qualification</li><li>• 120 marks</li></ul>
<p>The paper includes calculations, short-open and open-response questions. as well as extended-writing questions focused on:</p> <ul style="list-style-type: none"><li>• Analysis and evaluation of design decisions and outcomes, against a technical principle, for prototypes made by others</li><li>• Analysis and evaluation of wider issues in design technology, including social, moral, ethical and environmental impacts.</li></ul> <ul style="list-style-type: none"><li>• Students must answer all questions.</li><li>• Students must have calculators and rulers in the examination</li></ul> <p>Content is Topics 1 - 12</p>	<p>The investigation report is internally assessed and externally moderated.</p> <ul style="list-style-type: none"><li>• Students will produce a substantial design, make and evaluate project which consists of a portfolio and a prototype</li><li>• The portfolio will contain approximately 40 sides of A3 paper (or electronic equivalent)</li></ul> <p>There are four parts to the assessment:</p> <p>Part 1: Identifying Opportunities for Design Part 2: Designing a Prototype Part 3: Making a Prototype Part 4: Evaluating own Design and Prototype</p>



# Component 1 - content

Topic	Included in A level	Included in AS
1. Materials	Y	Y
2. Performance characteristics of materials	Y	Y
3. Processes and techniques	Y	Y
4. Digital technologies	Y	Y
5. Factors affecting the development of products	Y	Y
6. Effects of technological developments	Y	Y
7. Potential hazards and risk assessment	Y	Y
8. Features of manufacturing industries	Y	N
9. Designing for maintenance and the cleaner environment	Y	N
10. Current legislation	Y	N
11. Information handling, modelling and forward planning	Y	N
12. Further processes and techniques	Y	N



# Graphics content

- 1.5 Papers and boards
- 2.1 Performance characteristics of materials
- 3.3 Drawings
- 3.5 Finishing processes
- 4.1 CAD/CAM
- 5.3 Form/function
- 5.4 All movements
- 6.1 Technological developments
- 8. Features of manufacturing industries
- 9. Designing for maintenance and the cleaner environment
- 11.3 Intellectual property
- 12.1 user-centred design, circular economy

Students interested in graphics can focus on this content. However it is important to remember that ALL content will be assessed.



# A level component 1 – assessment

The written paper has a range of short and extended response questions plus maths calculations

- 2 hours 30 minutes
- 120 marks
- A level includes more explain and evaluation

The following questions illustrate some examples:

- 3(b) - 'describe using labelled sketches'
- 4(b) - maths
- 4(e) – new content
- 5(a) – 'state'
- 5(b)(i) – 'explain'
- 6 – 'discuss', new content
- 8 – 'evaluate' extended writing



# Command words

A list of the command word definitions can be found in Appendix 3 page 51 of the A level specification.



Any more questions on  
Component 1?



## A level component 2 – assessment

# Independent Design and Make Project, non-examined Assessment

- a **substantial** design, make and evaluate project which will test students' skills in designing and making a prototype
- The portfolio will contain approximately 40 sides of A3 paper (or electronic equivalent)
- 50% of the qualification
- No limit to the selection of a project (beyond time and resources available) so students can create a graphics project
- No suggested learning hours



## What is meant by 'prototype'?

The term 'prototype' means an appropriate working solution to a need or want that is sufficiently developed to be tested and evaluated (for example, full-sized products, scaled working models or functioning systems).



## A level NEA overview

- Students are required to identify a problem and a design context then develop a range of potential solutions and realise one
- Encourages creativity and imagination
- Apply iterative processes
- Real world problems, with associated needs, wants and values of the end user
- Students should take ownership
- Apply maths and science principles



# Conditions

There are certain conditions which have to be followed during the NEA

- Task taking
  - What teachers can do, must do and must not do whilst students are undertaking the NEA
  - More detail on page 33
- Task writing
  - Authentication, portfolio guidance and evidence required whilst writing the task
  - More detail on page 34
- Marking, standardisation and moderation
  - Requirements to be followed when marking, and the moderation process. JCQ instructions
  - More detail on page 35



# Independent Design and Make Project

Content - in 4 parts:

## 1. Identifying Opportunities for Design

- Identification of a design problem
- Investigation of needs and research
- Specification

## 2. Designing a Prototype

- Design ideas
- Development of design ideas
- Final design solution
- Review of development and final idea
- Communication of design ideas



# Independent Design and Make Project (continued)

## 3. Making a final prototype

- Tools and equipment

And

- Quality and accuracy

## 4. Evaluating own Design and Prototype

- Testing and evaluating



# NEA assessment

A Candidate Assessment Booklet (CAB) will be provided for you to add your marks

Marking is levels-based throughout

Take a holistic approach to marking

See page 21 in the specification



Any more questions on  
Component 2?

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2017



AS level specification



# AS assessment overview

<b>Component 1: Principles of Design and Technology</b>	<b>Component 2: Independent Design and Make Project</b>
<ul style="list-style-type: none"><li>• Written exam, externally assessed</li><li>• 2 hours</li><li>• 50% of qualification</li><li>• 100 marks</li></ul>	<ul style="list-style-type: none"><li>• Non-examined assessment, internally assessed and externally moderated</li><li>• 50% of qualification</li><li>• 100 marks</li></ul>
<p>The paper includes calculations, short-open and open-response questions. as well as extended-writing questions focused on:</p> <ul style="list-style-type: none"><li>• Analysis and evaluation of design decisions and outcomes, against a technical principle, for prototypes made by others</li><li>• Analysis and evaluation of wider issues in design technology, including social, moral, ethical and environmental impacts.</li></ul> <ul style="list-style-type: none"><li>• Students must answer all questions.</li><li>• Students must have calculators and rulers in the examination</li></ul> <p>Content is Topics 1 - 7</p>	<p>The investigation report is internally assessed and externally moderated.</p> <ul style="list-style-type: none"><li>• Students to undertake a small-scale design, make and evaluate project in response to a realistic contextual challenge set by Pearson, taking into account the needs and wants of the user</li><li>• The project consists of a portfolio and a prototype</li><li>• The portfolio will contain approximately 30 sides of A3 paper (or electronic equivalent)</li></ul> <p>There are four parts to the assessment (slight differences to A level)</p>



# Subject content

Topic	Included in A level	Included in AS
1. Materials	Y	Y
2. Performance characteristics of materials	Y	Y
3. Processes and techniques	Y	Y
4. Digital technologies	Y	Y
5. Factors affecting the development of products	Y	Y
6. Effects of technological developments	Y	Y
7. Potential hazards and risk assessment	Y	Y
8. Features of manufacturing industries	Y	N
9. Designing for maintenance and the cleaner environment	Y	N
10. Current legislation	Y	N
11. Information handling, modelling and forward planning	Y	N
12. Further processes and techniques	Y	N

Subset of A level content



# Graphics content

- 1.5 Papers and boards
- 2.1 Performance characteristics of materials
- 3.3 Drawings
- 3.5 Finishing processes
- 4.1 CAD/CAM
- 5.3 Form/function
- 5.4 All movements
- 6.1 Technological developments

Students interested in graphics can focus on this content. However it is important to remember that ALL content will be assessed.



# AS level component 1 – assessment

The written paper has a range of short and extended response questions plus maths calculations

- 2 hours
- 100 marks

The following questions illustrate some examples:

- 1 – a good range of question types in a single question, including maths
- 2(b) – ‘describe using labelled sketches’
- 4(d) – isometric drawing
- 7 – ‘evaluate’ extended writing



Any more questions on  
Component 1?



## AS NEA overview

- Students are required to follow the iterative design processes of exploring, creating and evaluating.
- Apply maths and science principles



# Conditions

There are certain conditions which have to be followed during the NEA

This is the same as for A level.

The relevant pages at AS are pages 27-29



# The contextual challenge

Each year a contextual challenge will be released

It will be based around a central theme

Students must then pick one of five contextual challenges which must be completed in relation to the central theme.

The contextual challenge will be issued by Pearson no earlier than June 1<sup>st</sup> in the year preceding assessment and awarding.

It will accommodate graphics.

Page 41 of the Sample Assessment Materials booklet



# Independent Design and Make Project

Content - in 4 parts:

## 1. Identifying Opportunities for Design

- Investigation of needs and research
- Specification

## 2. Designing a Prototype

- Design ideas
- Review of initial ideas
- Development of design ideas into a final design
- Review of development and final idea
- Communication of design ideas



# Independent Design and Make Project (continued)

## 3. Making a final prototype

- Tools and equipment

And

- Quality and accuracy

## 4. Evaluating own Design and Prototype

- Testing and evaluating



# NEA assessment

As for A level –

- A Candidate Assessment Booklet (CAB) will be provided for you to add your marks
- Marking is levels-based throughout
- Take a holistic approach to marking

See page 16 in the specification



Any more questions on  
Component 2?

AS and A level  
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Co-teachability





# Co-teachability example

Year 1			Year 2		
Autumn	Spring	Summer	Autumn	Spring	Summer
Teach everyone Topics 1-7	AS – NEA contextual challenge. A – do NEA as practice making.	AS – revise topics 1-7, submit NEA and sit exam. A - revise topics 1-7, start to develop NEA idea into their own brief for A level NEA, start A level Topics 8-12.	A level topics Start NEA	Finalise NEA	Revision and exam

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Our support





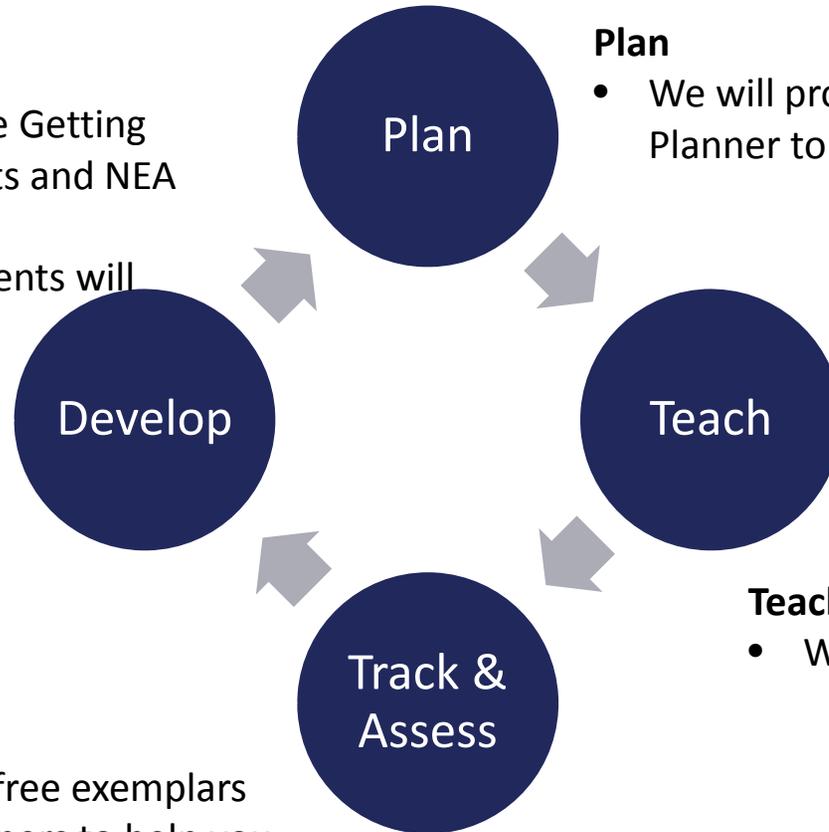
# Supporting great Design and Technology teaching

## Develop

- We will offer you free Getting Ready to Teach events and NEA Marking Training
- Paid for Feedback events will also be available

## Track & Assess

- We will give you free exemplars and specimen papers to help you track your students' progress



## Plan

- We will provide you with a free Course Planner to help you timetable your lessons

## Teach

- We will give you free
  - Editable Schemes of Work
  - Hints on how to teach Maths skills
  - Guidance on how to follow a Graphics Route



## ResultsPlus

- **ResultsPlus** provides the most detailed analysis available of your students' exam performance. This free online service helps you identify topics and skills where students could benefit from further learning, helping them gain a deeper understanding of Design and Technology.



## Edexcel GCSE and A level in Design and Technology

- Our GCSE and A level qualifications have been designed together to ensure progression so that students will have a coherent experience of moving from the breadth of the GCSE to the depth of A level and beyond.



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Information email:  
[aaresourcing@pearson.com](mailto:aaresourcing@pearson.com)



## Contact details



Subject Advisor:  
Evren Alibaba

The Design and Technology team  
email:

- [teachingdesignandtechnology@pearson.com](mailto:teachingdesignandtechnology@pearson.com)

telephone:

- 020 7010 2166

Twitter:

- [@PearsonTeachDT](https://twitter.com/PearsonTeachDT)



## Next steps

- Please complete your evaluation form for today's event.
- Visit the website for support materials and updates:
- <http://qualifications.pearson.com/en/qualifications/edexcel-a-levels/design-technology-product-design-2017.html>



Questions?