

GCSE Design and Technology Introduction to the New Specification

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This specification has been accredited by Ofqual

Structure of the session

- Overview of the new specification
- The written paper
-
- Non-Examined Assessment
- Resources and support

Objectives

- To understand the key elements of the specification structures, teaching content and assessment
- To review sample assessment material for GCSE
- To start thinking about implications for teaching and learning
- To review the resources and support available from AQA

Background of our GCSE in Design and Technology

- Developed by an experienced team of teachers and examiners
- The result of extensive consultation with teachers
- Designed to engage young people in this subject and provide effective assessments across the ability range
- Replaces **all** existing GCSE qualifications in this subject.
- Fulfils all Department for Education content and Ofqual requirements
- Fully accredited January 2017
- The new specification is for teaching from September 2017, with first assessment in summer 2019

Underlying principles

This is a design based course

- The specification combines theoretical content with practical application
- The use of mathematical skills is a key requirement and is tested in the examination (15% of the written paper)
- An understanding of underlying scientific principles is expected
- An iterative approach to designing is encouraged
- The acquisition of practical skills is still expected

Overview of specification content

- Core Technical Principles
- Specialist Technical Principles
- Designing and Making Principles
- Assessments

GCSE D&T Specification at a glance

Component 1: Title Written Paper	50%	Untiered	<ul style="list-style-type: none">• Single paper of 2 hours duration• 100 marks• Questions vary from MCQs to extended response
Component 2: Title Non-Examined Assessment	50%	Untiered	<ul style="list-style-type: none">• 100 marks• Single design and make task• Select from a range of given contexts

Assessment Objective 1 GCSE D&T

Identify, investigate and outline design possibilities to address needs and wants.

This AO forms 10% of the qualification and is examined solely through the NEA

Identify: look at areas and opportunities to design

Investigate: pursue ideas and gather information relating to a context.

These are interdependent and take place in no particular order.

Outline: produce a design brief and specification to inform AO2

Assessment Objective 2 GCSE D&T

Design and make prototypes that are fit for purpose

Allocated 30% of the qualification, this AO is examined through the NEA.

Design: the generation and development of ideas that can be presented to third parties and can be evaluated and tested in AO3.

Prototype: an appropriate working solution to a need or want, sufficiently developed to be tested and evaluated.

e.g. full sized products, scaled working models or functioning systems.

Fit for purpose: addressing the needs/wants of the intended user

Assessment Objective 3 GCSE D&T

Analyse and evaluate

- **Design decisions and outcomes, including prototypes made by themselves and others**
- **Wider issues in design and technology**

20% overall, split 10% in the paper and 10% in the NEA

Analyse: deconstruct information and/or issues to find connections and provide logical chains of reasoning.

Evaluate: appraise and/or make judgements with respect to information and/or issues.

Analysis and evaluation should draw on underpinning knowledge and understanding.

Assessment Objective 4 GCSE D&T

Demonstrate and apply knowledge and understanding of:

- **technical principles**
- **designing and making principles**

40% of the overall qualification and examined solely in the written paper.

An opportunity for students to show what they know and explain how that knowledge can be applied.

Key features and benefits

- Provides sound progression from Key Stage 3
- Offers relevant and interesting content for study
- Focuses on the production of a prototype
- Gives centres the flexibility of adopting a broad multi-material or more specialised approach
- Students have the opportunity to work with a wide range of materials or to specialise once the core has been covered
- Enables progression to further study at A-level or Level 3 vocational courses
- Complements study in related Level 1/2 Technical Awards or GCSE Engineering
- Automatically counts towards school/college performance tables

The written paper



Content and skills for the written paper – Section A

Core technical principles

- New and emerging technologies
- Evaluation
- How energy is generated and stored
- Modern and smart materials
- Understanding a systems approach when designing
- Mechanical devices
- Materials and their working properties

Content and skills for the written paper – Section B

Specialist technical principles

- Selection of materials or components
- Forces and stresses on materials
- Ecological and social footprint
- Scales of production
- Sources and origins
- Physical and working properties
- Stock forms, types and sizes
- Specialist techniques (including quality control)
- Surface treatments and finishes

Content and skills for written paper – Section C

Designing and making principles

- Contexts
- Primary and secondary data
- Needs and wants
- Investigation
- Environmental, social and economic challenges
- Idea development
- The work of others
- Design strategies
- Communication of design ideas
- Prototype development

Content and skills for the written paper – Section C

Designing and making principles - continued

- Selection
- Marking out
- Tolerances
- Waste
- Tools and equipment
- Techniques and processes
- Finishes

Assessment Objectives for the **Written Paper**

Assessment Objectives

AO3: Analyse and evaluate – wider issues in design and technology (20% overall – 10% of which is assessed through the written paper)

AO4: Demonstrate and apply knowledge and understanding of:

- technical principles
- designing and making principles

(40% overall – all of which is assessed through the written paper)

Structure of the written paper

- It's a 2-hour paper 50% of total marks
- There are three sections:
 - section a (20 marks) consists of multiple choice and short answer questions examining core technical principles
 - section b (30 marks) consists of longer response questions that assess the specialist technical principles
 - section c (50 marks) consists of questions that assess the designing and making principles.

Marking criteria

Only AO3 and AO4 are examined on the paper	
Analyse and evaluate	20 marks
Demonstrate and apply knowledge and understanding	80 marks
Application of mathematics	15 marks from above
Total	100 marks

Specimen paper questions – section a

1 A designer has created a security system for use in a home. The system is intended to alert the home owner to an intruder. What is the input in this system?

A Alarm sound

B Automatic message sent to mobile phone

C Flashing light

D Motion sensor

[1 mark]

Specimen paper questions – section a

2

Figure 1 shows a stool.



Figure 1

When a person sits on this stool, what is the main force on the stool leg?

- A Compression
- B Shear
- C Tension
- D Torsion

[1 mark]

Specimen paper questions – section a

5

Which **one** of the following statements is true?

- A** Balsa is a natural material used in model making
- B** Medium Density Fibreboard is a man-made material commonly used for outdoor furniture
- C** Silk is a man-made material used in the textiles industry
- D** Urea formaldehyde is a natural material used to manufacture electrical sockets

[1 mark]

Specimen paper questions – section a

12

State **two** reasons why corrugated cardboard is used as packaging for cooked pizzas.

[2 marks]

1.

2.

Specimen paper questions – section a

13 . 1

In 2010 the use of renewable energy in the UK accounted for 6.5% of total energy usage. By 2015 this figure had increased to 25%.

Give two reasons for the increase in the use of renewable energy sources.

[2 marks]

1.

2.

13 . 2

Explain why some people are opposed to the use of renewable energy sources.

[2 marks]

Specimen paper questions – section b

The following are examples of different stock forms.

Stock forms				
Acrylic rod	Corrugated cardboard sheet	Aluminium sheet	Wool yarn	Medium Density Fibreboard (MDF)

14

Choose **one** of the stock forms in the table on page 10.

Name **one** of the primary sources it is made from.

In the box below, use notes **and/or** sketches to explain the process of changing it from primary source to stock form.

[5 marks]

Name of stock form

Name of primary source

Specimen paper questions – section b

19

Designers sometimes make choices about the materials they use according to their impact on society.

Examples include the use of fair trade cotton, recycled components and biodegradable packaging.

Evaluate how the use of such materials might be seen as the ethical choice.

[10 marks]

Specimen paper questions – section c

21 . 1

You have been asked to redesign the watch shown on page 19 to make it suitable for a child aged between 9 and 11 years old.

The data in the table below shows the preferred colour scheme according to 240 children aged between 9 and 11 years old.

Complete the table by calculating the missing percentage of children who like different colours.

[1 mark]

Colour Scheme	Number of children	Percentage of total
Pastel colours	60	25%
Primary colours	102	
Fluorescent colours	36	15%
Subtle colours	30	
Metallic colours	12	5%
Total	240	

Unit 2. Non-Examined Assessment



Content and skills for non-examined assessment

- Investigating and analysing the contextual challenge / client needs / factors such as social or economic challenges.
- Identify design possibilities, consider the work of others
- Communicate design ideas
- Develop a prototype
- Select materials
- Mark out and manage material
- Use tools and equipment / techniques and processes
- Analyse and evaluate by testing

Assessment Objectives for NEA

Assessment Objectives

AO1: Identify, investigate and outline design possibilities to address needs and wants (10% overall – all of which is assessed through NEA)

AO2: Design and make prototypes that are fit for purpose (30% overall – all of which is assessed through NEA)

AO3: Analyse and evaluate – design decisions and outcomes, including prototypes made by themselves and others (20% overall – of which 10% is assessed through NEA)

Structure of NEA

- Based on the three contexts released by AQA each June
- No material or technology limitations
- 50% of total marks
- Assessment is across four assessment criteria
- Portfolios may be paper based or in electronic format
- Must be the student's own work, taking 30-35 hours to complete
- Produce a working prototype and portfolio of evidence (max 20 pages).

Marking criteria

The assessment criteria for the NEA are split into six sections as follows.

	Section	Criteria	Maximum marks
AO1 Identify, investigate & outline design possibilities	A	Identifying & investigating design possibilities	10
	B	Producing a design brief & specification	10
A02 Design & make prototypes that are fit for purpose	C	Generating design ideas	20
	D	Developing design ideas	20
	E	Realising design ideas	20
A03 Analyse & evaluate	F	Analysing & evaluating	20
	Total		100

Sample contextual challenges

- A high profile event
- Addressing the needs of the elderly
- The contemporary home
- Children's learning and development
- The world of travel and tourism

Assessment criteria 1

4.4.4.1 Section A: Identifying & investigating design possibilities (10 marks)

By analysing the contextual challenge students will identify design possibilities, investigate client needs and wants and factors including economic and social challenges. Students should also use the work of others (past and/or present) to help them form ideas. Research should be concise and relate to their contextual challenge. Students are also advised to use a range of research techniques (primary/secondary) in order to draw accurate conclusions. Students should be encouraged to investigate throughout their project to help inform decisions.

Mark band	Description
9 – 10	<p>Design possibilities identified and thoroughly explored, directly linked to a contextual challenge demonstrating excellent understanding of the problems/opportunities.</p> <p>A user/client has been clearly identified and is entirely relevant in all aspects to the contextual challenge and student has undertaken a comprehensive investigation of their needs and wants, with a clear explanation and justification of all aspects of these.</p> <p>Comprehensive investigation into the work of others that clearly informs ideas.</p> <p>Excellent design focus and full understanding of the impact on society including; economic and social effects.</p> <p>Extensive evidence that investigation of design possibilities has taken place throughout the project with excellent justification and understanding of possibilities identified.</p>

Assessment criteria 2

4.4.4.3 Section C: Generating design ideas (20 marks)

Students should explore a range of possible ideas linking to the contextual challenge selected. These design ideas should demonstrate flair and originality and students are encouraged to take risks with their designs. Students may wish to use a variety of techniques to communicate. Students will not be awarded for the quantity of design ideas but how well their ideas address the contextual challenge selected. Students are encouraged to be imaginative in their approach by experimenting with different ideas and possibilities that avoid design fixation. In the highest band students are expected to show some innovation by generating ideas that are different to the work of the majority of their peers or demonstrate new ways of improving existing solutions.

Mark band	Description
16 – 20	<p>Imaginative, creative and innovative ideas have been generated, fully avoiding design fixation and with full consideration of functionality, aesthetics and innovation.</p> <p>Ideas have been generated, that take full account of on-going investigation that is both fully relevant and focused.</p> <p>Extensive experimentation and excellent communication is evident, using a wide range of techniques.</p> <p>Imaginative use of different design strategies for different purposes and as part of a fully integrated approach to designing.</p>

Assessment criteria 3

4.4.4.5 Section E: Realising design ideas (20 marks)

Students will work with a range of appropriate materials/components to produce prototypes that are accurate and within close tolerances. This will involve using specialist tools and equipment, which may include hand tools, machines or CAM/CNC. The prototypes will be constructed through a range of techniques, which may involve shaping, fabrication, construction and assembly. The prototypes will have suitable finish with functional and aesthetic qualities, where appropriate. Students will be awarded marks for the quality of their prototype(s) and how it addresses the design brief and design specification based on a contextual challenge.

Mark band	Description
16 – 20	<p>The correct tools, materials and equipment (including CAM where appropriate) have been consistently used or operated safely with an exceptionally high level of skill.</p> <p>A high level of quality control is evident to ensure the prototype is accurate by consistently applying very close tolerances.</p> <p>Prototype shows an exceptionally high level of making/finishing skills that are fully consistent and appropriate to the desired outcome.</p> <p>An exceptionally high quality prototype that has the potential to be commercially viable has been produced and fully meets the needs of the client/user.</p>

Assessment criteria 4

4.4.4.6 Section F: Analysing & evaluating (20 marks)

Within this iterative design process students are expected to continuously analyse and evaluate their work, using their decisions to improve outcomes. This should include defining requirements, analysing the design brief and specifications along with the testing and evaluating of ideas produced during the generation and development stages. Their final prototype(s) will also undergo a range of tests on which the final evaluation will be formulated. This should include market testing and a detailed analysis of the prototype(s).

Mark band	Description
16 – 20	<p>Extensive evidence that various iterations are as a direct result of considerations linked to testing, analysis and evaluation of the prototype, including well considered feedback from third parties.</p> <p>Comprehensive testing of all aspects of the final prototype against the design brief and specification. Fully detailed and justified reference is made to any modifications both proposed and undertaken.</p> <p>Excellent ongoing analysis and evaluation evident throughout the project that clearly influences the design brief and the design and manufacturing specifications.</p>

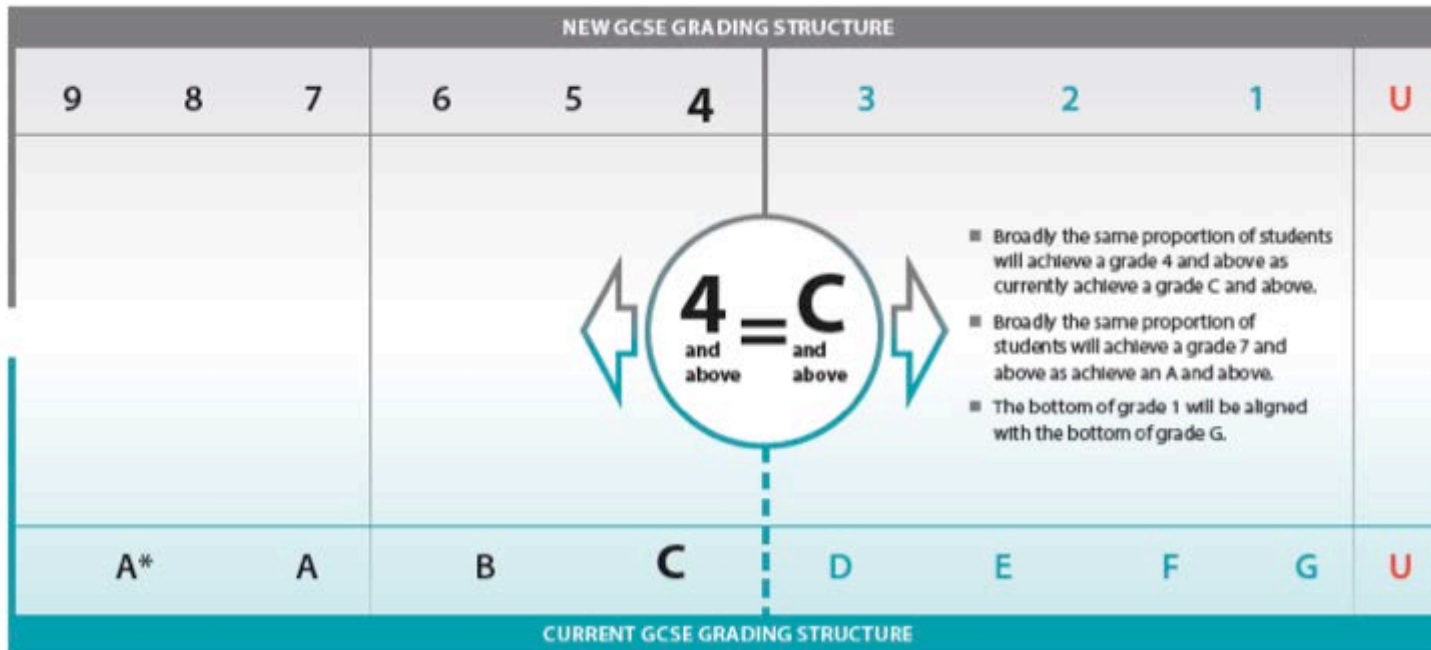
Suggestions for managing and planning

- Remember the changed weightings: more time needs to be spent teaching the content
- Keep in mind the increased emphasis on the application of mathematics
- There is a requirement for scientific understanding
- Remember that the Unit 2 contexts will not be released until June, with a submission date the following May
- Contexts will change every year, time will need to be set aside in June for choosing contexts and planning

Reform Overview - Grading

A new grading system will be introduced. Students will be awarded a grade from 1 - 9, with 9 being the highest.

Grading the New GCSEs in 2017

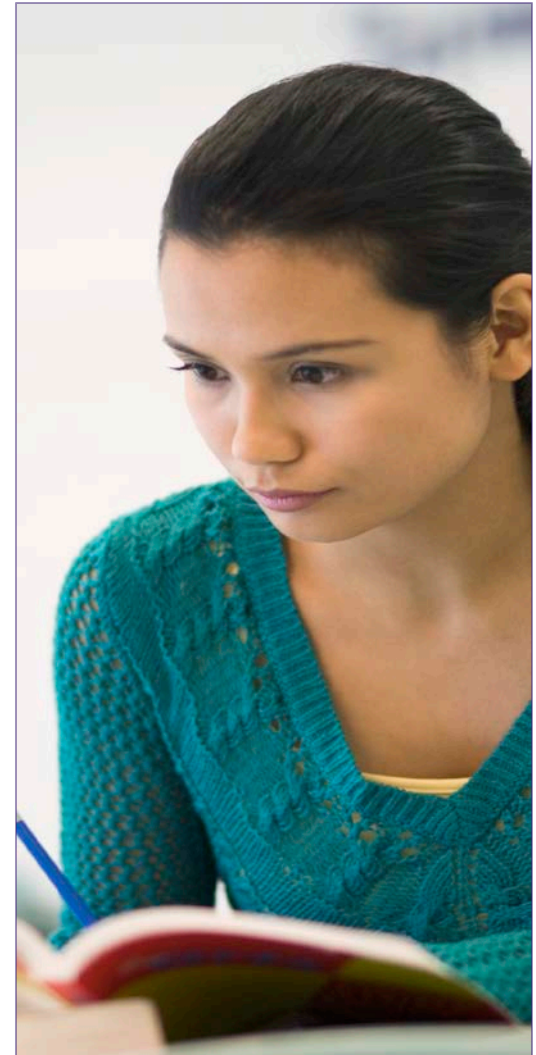


Summary

- 50/50 Written examination and NEA (coursework)
- NEA contexts released in June of the year before exam is taken
- Contexts changed every year
- 15% of written paper is required to assess mathematical knowledge and understanding (Ofqual requirement)
- The only GCSE in Design and Technology offered by AQA, as endorsements are not permitted.

AQA ongoing support and resources

- AQA website
- e-AQA
- Secure key materials
- ERA (Enhanced Results Analysis)
- Training courses
- Preparing to teach events
- AQA family of businesses
(Exampro)



Resources and support from AQA



Choosing the right qualification

- Draft specification
- Draft question papers and mark schemes
- Specification at a glance
- Summary of changes
- Documents to help you compare exam boards' specifications



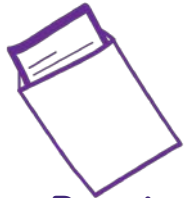
Planning your course

- Preparing to teach events
- Schemes of work
- Guidance on teaching



Teaching your students

- Resources linked to topics in the specification and throughout the teaching year (plan, teach, assess, results)
- Command words used in exams
- Publisher textbooks and digital resources
- Direct access to subject teams



Results: reviewing and planning for improvement

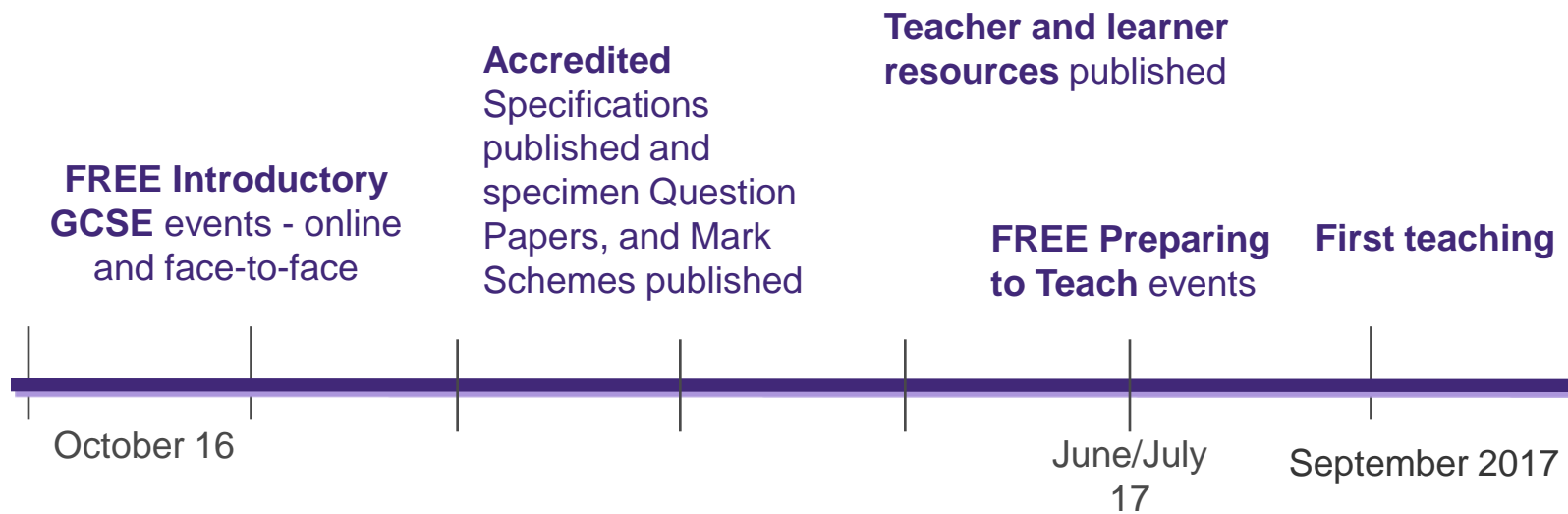
- Enhanced Results Analysis
- Feedback meetings
- Examiner reports
- Candidate exemplars with examiner commentary



Assess: preparing for exams

- Specimen question papers and mark schemes
- Additional sample questions
- Candidate exemplars with examiner commentary

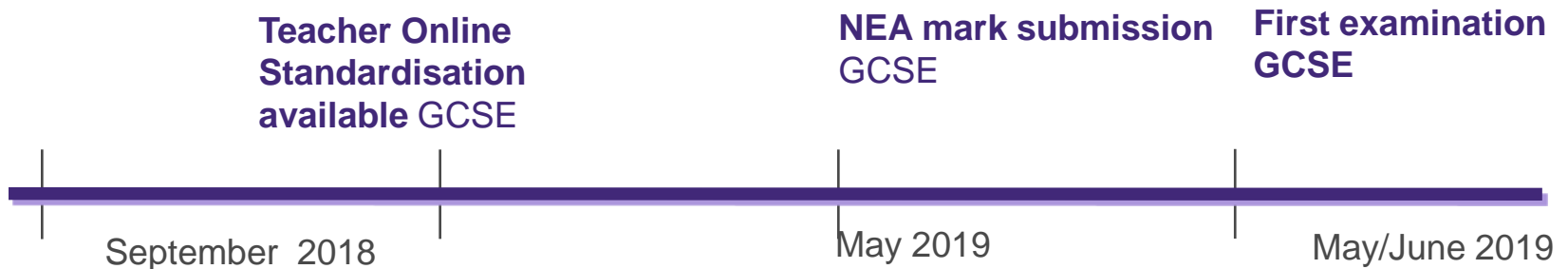
Timeline 1



Timeline 2

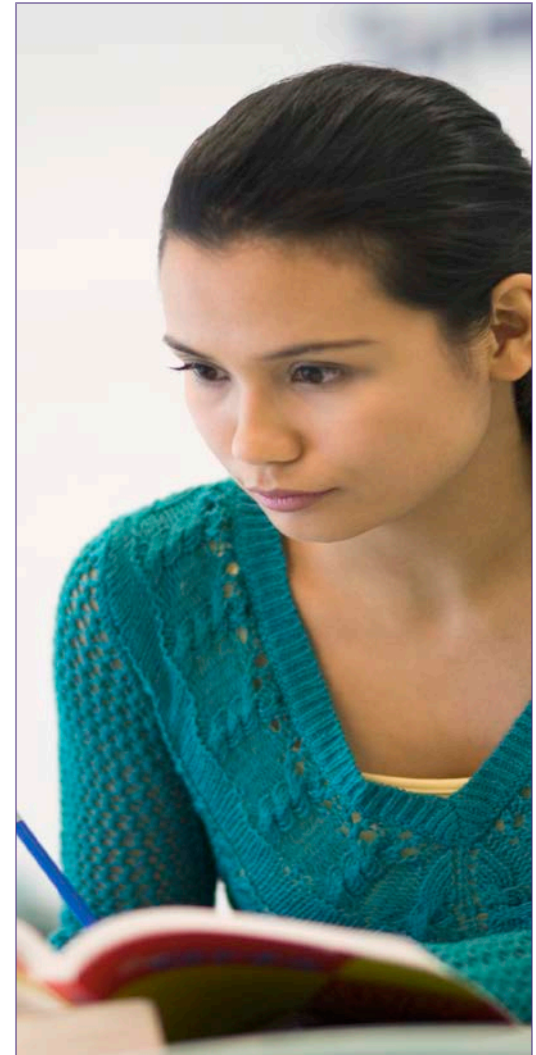
Teacher training courses available

Additional **teacher and learner resources** published



Subject resources

- Approved textbooks produced by independent publishers
- Online resources to support textbooks
- Video-based resources
- Additional sample question papers
- Teacher online standardising (TOLS) materials
- Additional materials such as sample schemes of work (Sow)



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