

Specification

GCE Design and Technology: Food Technology

Pearson Edexcel Level 3 Advanced Subsidiary GCE in Design and Technology: Food Technology (8FT01)
First examination 2014

Pearson Edexcel Level 3 Advanced GCE in Design and Technology: Food Technology (9FT01)
First examination 2014

Issue 3

About this specification

The Edexcel GCE in Design and Technology: Food Technology is designed for use in schools and colleges. It is part of a suite of GCE qualifications offered by Edexcel.

Key features of the specification

This qualification focuses on key areas that the food industry has to consider, including:

- quality of food
- processing of food
- packaging and labelling
- nutrition value and contribution to dietary control and sustained good health
- health and safety.

Another key factor covered in this qualification is sustainability. New products have to provide solutions rather than add to the existing problems of extraction and use of natural resources, pollution from manufacturing and the disposal of large amounts of waste products.

Why choose this specification?

Edexcel's GCE in Design and Technology: Food Technology seeks to:

- develop students' knowledge, understanding, skills and application for designing food products
- develop a student's ability to produce food products that are fit for purpose, satisfy wants or needs, and enhance our day-to-day lives
- give students the opportunity to demonstrate their design and technology capability
- develop skills in planning, research, analysis, product development, project planning and evaluation.

Supporting you

Edexcel aims to provide the most comprehensive support for our qualifications. We have therefore published our own dedicated suite of resources for teachers and students written by qualification experts.

For more information on our wide range of support and services for this GCE in Design and Technology qualification, visit our GCE website: www.edexcel.com/gce2008.

Specification updates

This specification is Issue 3 and is valid for examination from Summer 2014. If there are any significant changes to the specification Edexcel will write to centres to let them know. Changes will also be posted on our website.

For more information please visit www.edexcel.com or www.edexcel.com/gce2008.

Contents

A	Specification at a glance	4
B	Specification overview	9
	Summary of assessment requirements	9
	Assessment objectives and weightings	11
	Relationship of assessment objectives to units	11
	Qualification summary	11
C	Design and Technology: Food Technology unit content	13
	Course structure	14
	Unit 1 Portfolio of Creative Skills	15
	Unit 2 Design and Technology in Practice	35
	Unit 3 Food Products, Nutrition and Product Development	47
	Unit 4 Commercial Design	57
D	Assessment and additional information	73
	Assessment information	73
	Additional information	77
E	Resources, support and training	81
	Edexcel publications	81
	Additional resources endorsed by Edexcel	81
	Edexcel support services	82
	Training	83

F	Appendices	85
	Appendix 1 Performance descriptions	87
	Appendix 2 Further resources and support	93
	Appendix 3 Wider curriculum	97
	Appendix 4 Codes	99

A Specification at a glance

AS Unit 1: Portfolio of Creative Skills

*Unit code 6FT01

- Internally assessed
- Availability: June

**60%
of the
total AS
marks**

**30% of
the total
GCE
marks**

Content summary:

In this unit students are given the opportunity to develop their creative, technical and practical skills through a series of product investigation, design and manufacturing activities.

Students will produce **one** portfolio with **three** distinct sections which will demonstrate their creativity and flair when investigating, designing and making product(s). Ideally different products should be chosen for the **three** distinct sections as students are not being asked to carry out one large design and make exercise but three smaller and more focused tasks which build up to provide a detailed portfolio of their skills.

This unit has been designed to be as flexible as possible, offering students a wide range of valid approaches in producing their portfolio of creative skills. Students are encouraged to be as creative as possible and there are no barriers to choices of product investigation, product design or product manufacture, as long as the work submitted by students targets assessment criteria effectively and at the correct level of response for their abilities.

Assessment:

This unit is internally set and marked by the centre and externally moderated by Edexcel.

The student will produce **one** portfolio that contains evidence for all **three** distinct sections.

AS Unit 2: Design and Technology in Practice***Unit code 6FT02**

- Externally assessed
- Availability: June

**40%
of the
total AS
marks**

**20% of
the total
GCE
marks**

Content summary:

In this unit students will develop a knowledge and understanding of a wide range of materials, components, additives and processes used in the design and production of food products. It is important for students to learn about the main food components, their physical nature and working properties. Similarly, students need to know the various stages in preparing foods for large-scale production. They must also learn the fundamental principles underpinning food preservation and the various techniques involved.

Quality of food is of major importance to the manufacturer and consumer. It is therefore essential for students to understand the principles of food quality control and good manufacturing practice in the food industry.

Assessment:

1 hour 30 minute examination set and marked by Edexcel.

The paper will be a question and answer booklet, consisting of short-answer and extended-writing type questions, all of which are compulsory.

* See *Appendix 4* for description of this code and all other codes relevant to this qualification.

A2	Unit 3: Food Products, Nutrition and Product Development	*Unit code 6FT03	
<ul style="list-style-type: none"> ■ Externally assessed ■ Availability: June 		40% of the total A2 marks	20% of the total GCE marks

Content summary:

In this unit students will develop a knowledge and understanding of a range of food commodities, aspects of nutrition, product development and food innovation. It is essential for students to have a comprehensive knowledge of the main food commodities, their composition, basic processing and typical spoilage patterns.

A sound knowledge of nutrition and its influence on the diet, contemporary lifestyle issues and new product development is particularly important for food technologists. Similarly, consumer behaviour, demographics, modern lifestyles and sustainable issues have an influence on new product development. It is also important for students to be aware of the influence of new technologies and materials on the development of new food products.

Assessment:

2-hour examination paper set and marked by Edexcel.

The paper will be a question and answer booklet, consisting of short-answer and extended-writing type questions, all of which are compulsory.

A2 Unit 4: Commercial Design***Unit code 6FT04**

- Internally assessed
- Availability: June

**60%
of the
total A2
marks****30% of
the total
GCE
marks****Content summary:**

In this unit students are given the opportunity to apply the skills they have acquired and developed throughout this course of study, to design and make a food product of their choice.

In order to reach high attainment levels, students must adopt a commercial design approach to their work, reflecting how a professional might deal with a design problem and its resolution.

The choice of design problem should have a real commercial use, in that it should be useful to a wider range of users beyond an individual, unless it has been specifically commissioned as a 'one-off'. The design problem should provide opportunities for a client or user-group to have input into decision making at various stages of the design and make process.

A client or user-group is defined as any third party identified by a student, that is referred to and who can give informed critical feedback at various stages throughout the design process. Clients and user-groups do not need to be specialists or experts; they can be drawn from any relevant group of people and may include other students, friends or family members.

A key feature of this unit is that students consider issues related to sustainability and the impact their product may have on the environment. A student may choose to design and make a sustainable product, but if they do not, they should still consider the issues of sustainability at relevant points in their designing and making activities. Sustainable issues include materials, components/ingredients production and selection, manufacturing processes, use of the product and its disposal/recycling.

Assessment:

This unit is internally set and marked by the centre and externally moderated by Edexcel.

Students are given the opportunity to design and make a product of their choice. This unit results in the development of an appropriate product supported by a design folder.

B Specification overview

Summary of assessment requirements

Unit number and unit title	Level	Assessment information	Number of raw marks allocated in the unit
Unit 1: Portfolio of Creative Skills	AS	<p>This unit is internally set and marked by the centre and externally moderated by Edexcel.</p> <ul style="list-style-type: none"> ■ In the product investigation, the chosen product can be set by the teacher or the student. ■ In the product design, the design brief(s)/need(s) can be set by the teacher or the student. ■ In the product manufacture, the design brief(s)/need(s) should be set by the teacher to ensure that a range of materials and/or components/ingredients, techniques and processes is used. <p>The maximum number of marks available for each discrete section is 30. One overall mark out of 90 is required.</p> <p>The student will produce one portfolio that contains evidence for all three distinct sections.</p> <p>Photographic evidence of their modelling can be used as part of the evidence provided in the design section.</p> <p>As proof of the quality of their making skills (and the level of demand of their work), photographs of their work must be taken to show that the product(s) is complete, expertly made and well finished.</p> <p>The photographs must show clearly details of any advanced skills, technical content, levels of difficulty and complexity of construction, so students can achieve the marks they deserve.</p> <p>Students can submit their work electronically for moderation. Please refer to the <i>Edexcel Information Manual</i> document, which is available on the Edexcel website www.edexcel.com, for further detail.</p>	90
Unit 2: Design and Technology in Practice	AS	<p>This unit is assessed through a 1 hour 30 minute examination paper set and marked by Edexcel.</p> <p>The paper will be a question and answer booklet and all questions in the paper are compulsory.</p> <p>The paper will consist of short-answer and extended-writing type questions.</p> <p>The first examination will be in 2009 and will be available in the summer of each examination series.</p>	70
Unit 3: Food Products, Nutrition and Product Development	A2	<p>The unit is assessed through a 2-hour examination paper set and marked by Edexcel.</p> <p>The paper will be a question and answer booklet and all questions in the paper are compulsory.</p> <p>The paper will consist of short-answer and extended-writing type questions.</p>	70

B Specification overview

Unit number and unit title	Level	Assessment information	Number of raw marks allocated in the unit
Unit 4: Commercial Design	A2	<p>This unit is internally set and marked by the centre and externally moderated by Edexcel.</p> <p>Students are given the opportunity to design and make a product of their choice.</p> <p>The maximum number of marks available is 90.</p> <p>It is important that all stages of the manufacturing process are photographed in order to evidence that the product is complete, expertly made and well finished. Students must ensure that photographs show clearly any details of advanced skills, technical content, levels of difficulty and complexity of construction, so that they can achieve the marks they deserve.</p> <p>It is unlikely that a single photograph will be enough to communicate all of the information required, so it will be better to take a series of photographs during making.</p> <p>This unit results in the development of an appropriate product supported by a design folder. The folder, which should include ICT generated images where appropriate, can only be submitted on A3 paper and is likely to be no more than 30 pages long.</p> <p>Students can submit their work electronically for moderation. Please refer to the <i>Edexcel Information Manual</i> document, which is available on the Edexcel website www.edexcel.com, for further detail.</p>	90

Assessment objectives and weightings

		% in AS	% in A2	% in GCE
A01	Students 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.	39%	52%	45.5%
A02	Students 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.	61%	48%	54.5%
TOTAL		100%	100%	100%

Relationship of assessment objectives to units

Unit number	Assessment objective		
	A01	A02	Total for A01 and A02
Unit 1	12%	18%	30%
Unit 2	7.5%	12.5%	20%
Unit 3	15%	5%	20%
Unit 4	11%	19%	30%
Total for Advanced GCE	45.5%	54.5%	100%

Qualification summary

Subject criteria

The General Certificate of Education is part of the Level 3 provision. This specification is based on the Advanced Subsidiary GCE and Advanced GCE Subject Criteria for Design and Technology; which are prescribed by the regulatory authorities and are mandatory for all awarding bodies.

The GCE in Design and Technology has been designed to provide opportunities for students to develop their creativity, capability and entrepreneurial skills; to apply knowledge and understanding to a range of technological activities and to develop critical thinking and collaborative skills.

Aims

The aims of the Edexcel Advanced Subsidiary and Advanced GCE in Design and Technology are to encourage students to:

- make use of tacit knowledge and reflective practices in order to work with tasks that are challenging and often require definition
- develop and sustain their creativity and innovative practice
- recognise and overcome challenges and constraints when working towards the production of high-quality products
- develop a critical understanding of the influences of the processes and products of design and technological activities from a contemporary and historical perspective
- draw on a range of skills and knowledge from other subject areas
- draw on and apply knowledge, understanding and skills of production processes to a range of design and technology activities
- develop an understanding of contemporary design and technology practices
- use digital technologies and information handling skills to enhance their design and technological capability.

AS/A2 knowledge and understanding

This Advanced Subsidiary and Advanced GCE specification requires students to demonstrate the application and understanding of:

- materials and components/ingredients
- industrial and commercial practice
- quality
- health and safety
- products/outcomes and applications.

AS/A2 skills

This Advanced Subsidiary and Advanced GCE specification requires students to:

- communicate ideas and information
- evaluate
- design
- plan
- make.

C**Design and Technology: Food Technology unit content**

Unit 1 Portfolio of Creative Skills	15
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Unit 2 Design and Technology in Practice	35
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Unit 3 Food Products, Nutrition and Product Development	47
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Unit 4 Commercial Design	57
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Course structure

- Edexcel's GCE in Design and Technology: Food Technology comprises four units and contains an Advanced Subsidiary subset of two AS units.
- The Advanced Subsidiary GCE is the first half of the GCE course and consists of Units 1 and 2. It may be awarded as a discrete qualification or contribute 50 per cent of the total Advanced GCE marks.
- The full Advanced GCE award consists of the two AS units (Units 1 and 2), plus two A2 units (Units 3 and 4) which make up the other 50 per cent of the Advanced GCE. Students wishing to take the full Advanced GCE must, therefore, complete all four units.
- The structure of this qualification allows teachers to construct a course of study which can be taught and assessed either as:
 - ◆ distinct modules of teaching and learning with related units of assessment taken at appropriate stages during the course; or
 - ◆ a linear course which is assessed in its entirety at the end.

1.1 Unit description

In this unit, students are given the opportunity to develop their creative, technical and practical skills through a series of product investigation, design and manufacturing activities.

Students will produce **one** portfolio with **three** distinct sections which will demonstrate their creativity and flair when investigating, designing and making product(s). Students may use the same product for a designing exercise and a making exercise, but this unit offers an opportunity to choose **different** products for the **three** distinct sections as students are not being asked to perform one large design and make exercise but three smaller and more focused tasks which build up to provide a detailed portfolio of their skills.

This unit has been designed to be as flexible as possible, offering students a wide range of valid approaches in producing their portfolio of creative skills. Students are encouraged to be as creative as possible and there are no barriers to choices of product investigation, product design or product manufacture, as long as the work submitted by students targets assessment criteria effectively and at the correct level of response for their abilities.

When designing, students can be creative and adventurous. There is no requirement to realise the designs produced. There will be no material/component/ingredient or manufacturing restrictions and no limitations to design possibilities.

1.2 Assessment information

1 The portfolio

Students will produce **one** portfolio with **three** distinct sections — product investigation, product design and product manufacture.

Students should ideally look at **different** products for the **three** distinct sections.

- In the product investigation, the chosen product must contain more than **one** material and/or component/ingredient and process in order to access the full range of marks.
- In their product design, students can respond creatively and adventurously to one or more design brief(s)/need(s). Students will demonstrate creativity and flair using their design skills through the production of a range of alternative ideas that explore different approaches to the problem. Students will develop and refine their ideas, with the aid of modelling, into a final workable design proposal that will satisfy the design brief(s)/need(s). Students' designs must be realistic and workable, but they do not need to be taken to the manufacturing stage. Once their idea(s) have been fully developed into a viable product(s), they must communicate their design intentions to potential users.
- In their product manufacture, students should produce **one or more** high-quality product(s). This will allow them to demonstrate their knowledge and understanding of a **range** of materials and/or components/ingredients, techniques and processes by selecting and using those that are appropriate to the requirements of the task. A **range** can be defined as at least **two**.

While there is no defined limit to the number of pages students should include in their portfolio of creative skills, it is envisaged that all requirements of this unit can be achieved within 25-30 A3-size pages.

Students may choose to produce their product investigation in A3 or A4 format.

2 Task setting guidance

Edexcel does not prescribe the tasks undertaken for each of the **three** discrete sections.

When setting tasks the following points must be taken on board.

a) Product investigation

In the product investigation, the chosen product must contain more than **one** material and/or component/ingredient and process in order to access the full range of marks.

Although students may investigate a range of different products over the course of their AS studies for their portfolio, evidence of only **one** complete product investigation should be submitted. Evidence must **not** comprise of the best aspects of a range of product investigations.

The submitted product can be chosen by the teacher or the student.

b) Product design

In their product design, students can respond creatively and adventurously to one or more design brief(s)/need(s).

These design brief(s)/need(s) can be set by the teacher or the student, to produce solutions which are both fit for purpose and market viable.

c) Product manufacture

In their product manufacture, students should produce **one or more** high-quality product(s) that meets the requirements of the design brief(s)/need(s).

The design brief(s)/need(s) should contain requirements against which the final manufactured products can be measured. The design brief(s)/need(s) should be set by the teacher to ensure a range of materials and/or components/ingredients, techniques and processes are used.

The following must also be taken into account for each of the **three** discrete sections:

- time and resources available are considered
- students can fully demonstrate their capabilities in each of the assessment criteria, so that they maximise their potential achievements
- their product(s) complies with the requirements of a food technology product.

3 Assessment guidance

- This unit is internally set and marked by the centre using the assessment criteria in Section 1.6 and is externally moderated by Edexcel.
- The total number of marks available for each discrete section is 30. **One** overall mark out of 90 is required.
- The student will produce **one** portfolio that contains evidence for all **three** distinct sections.
- Photographic evidence of students' modelling can be used as part of the evidence provided in their design section.
- As proof of the quality of students' making skills (and the level of demand of their work), photographs of their work must be taken to show that the product(s) is complete, expertly made and well finished. The photographs must show clearly details of any advanced skills, technical content, levels of difficulty and complexity of construction, so that students can achieve the marks they deserve.
- Students can submit their work electronically for moderation. Please refer to the *Edexcel Information Manual* document, which is available on the Edexcel website www.edexcel.com, for further detail.

1.3 Product investigation

In this section, students will analyse an existing commercial product using their knowledge and understanding of designing and making. Students should take into consideration the intended function and performance of the product; the materials and/or components/ ingredients and processes used during its manufacture; how it was produced and how its quality was assured.

Although students may investigate a range of different products over the course of their AS studies, evidence of **one** complete product investigation should be submitted, therefore, evidence must not comprise of the best aspects of a range of product investigations.

The submitted product can be chosen by the teacher or the student.

The chosen product must contain more than **one** material and/or component/ingredient and process in order to access the full range of marks.

Students' work may be presented using any appropriate media, such as written evidence, sketching, photographs, cut and paste etc.

What students need to evidence:

1 Performance analysis

When analysing their chosen product, students should determine what it was that the designer set out to achieve and then produce a technical specification that covers key headings.

The technical specification should include:

- Form — why is the product shaped/styled as it is?
- Function — what is the purpose of the product?
- User requirements — what qualities make the product attractive to potential users?
- Performance requirements — what are the technical considerations that must be achieved within the product?
- Material and component/ingredient requirements — how should materials and components/ingredients perform within the product?
- Scale of production and cost — how does the design allow for scale of production and what are the considerations in determining cost?

The specification points should contain more than a single piece of information, so that each statement is fully justified by giving a reason for the initial point. For example, it is not sufficient to say 'the product should be low in fat and contain no more than 4 per cent fat per portion', as this is not justified until 'because a greater fat percentage raises the product beyond what is considered to be an acceptable fat content' is added.

As part of their analysis, students should look at one other existing similar product, using the same criteria identified in their technical specification to find out information about the product so that they can compare and contrast it with their own chosen product.

2 Materials and/or components/ingredients

Students should identify the materials and/or components/ingredients used in their chosen product and use their knowledge and understanding of their properties and qualities to suggest why in particular they have been selected for use.

The chosen product could have been made effectively in terms of quality and performance from other materials and/or components/ingredients. Students should investigate suitable alternative materials and/or components/ingredients and, using advantages and disadvantages, compare them with the materials and/or components/ingredients actually used.

Students should consider and explain the environmental effects of using the materials and/or components/ingredients identified in their product in relation to one or more of the following:

- production and processing of raw materials
- production processes
- disposal of waste produced during manufacture and use of the product.

3 Manufacture

Students should identify and describe the processes involved in the manufacture of their chosen product. They should justify their choice of processes.

It is important to consider that other methods of manufacture could have been used, so they should make clear **one** alternative method and compare and contrast it with the methods chosen. Students should also consider and describe the effects that using particular commercial processes have on the environment.

4 Quality

The student's chosen product will have gone through a series of checks to ensure it reaches the user in the best possible condition in terms of quality and performance.

Students should describe when and where quality control checks take place during the manufacture of the product, what the checks consist of and how they form part of a quality assurance system. Students should also identify and describe some of the main standards that must be met during product manufacture and how they influence production and the final product.

1.4 Product design

In this section, students can respond creatively and adventurously to one or more design brief(s)/need(s). These design brief(s)/need(s) can be set by the teacher or the student, to produce solutions which are both fit for purpose and market viable.

Students will demonstrate creativity and flair, using their design skills, through the production of a range of alternative ideas that explore different approaches to the problem. Using the best aspects of their initial designs, they will develop and refine their ideas, with the aid of experimental work and/or making, into a final workable design proposal that will satisfy the design brief(s)/need(s).

Students should be encouraged to be as creative as possible in their work and to disregard the limitations of the facilities available to them within their centre. Their designs must be realistic and workable, but they do not need to be taken to the manufacturing stage.

Once their idea(s) has been fully developed into a viable product(s), they must communicate their design intentions to potential users.

What students need to evidence:

1 Design and development

There are a number of possible starting points to this section. The design brief(s)/need(s) may be given to students by the teacher or students may define their own.

Two possible types of brief that students may want to use are:

- a focused design brief for a specific need/want
- a 'blue sky' project resulting in concepts using future technologies.

A detailed design specification is not required. However, the design brief must contain a range of design criteria that their final design proposal must meet.

Students should consider the design problem set and produce a range of alternative design ideas that focus on the whole or parts of the problem.

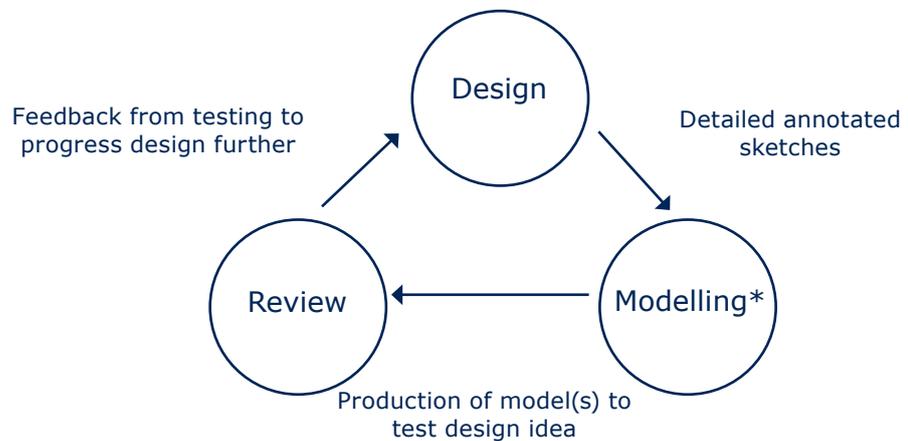
It is not necessary for students to produce a wide range of alternative ideas. It is better to produce high-quality focused work than lots of lower-quality work.

Students should explore different design approaches in their work, applying their knowledge of materials, components/ingredients, processes and techniques to produce realistic design proposals that satisfy the design brief(s)/need(s).

Students should evaluate each of their ideas objectively against the needs set out in their design brief(s)/need(s) to ensure that their designs are realistic and viable.

The use of detailed annotation is an important feature of design development and students should use it to explain details of design thinking and to offer thoughts on their design proposals.

To help students develop their design ideas, the following design development cycle could be useful. This is an important part of the design process and can be used to refine an initial idea into a workable design solution.



* modelling through experimental work and/or making

Modelling should be used to test features such as proportions, scale, function, sub-systems, organoleptic acceptability etc. Modelling can be achieved only through experimental work, making samples and/or making completed products. This evidence should be presented through clear, well-annotated photographs.

2 Communicate

When presenting their design and development work, it is essential that students communicate their ideas effectively.

Through design and development work

Students should show evidence of 'design thinking' using any form of effective communication that they feel is appropriate. However, they should try to use a range of skills that may include freehand sketching, cut and paste techniques, ICT, photography etc. It is important to demonstrate a high quality of presentation, which will be shown through the accuracy and precision of their work.

When using ICT, students should ensure that it is used appropriately. For example, nutritional analysis should be used only if applicable to students' ideas.

Through the quality of written communication

Annotation should be used to explain design details and convey technical information. Students should make sure that the information is understood and presented logically.

Specialist technical vocabulary should be used consistently with precision.

1.5 Product manufacture

In this section, students will use their production planning skills and have the opportunity to develop their making skills through manufacturing **one or more** high-quality product(s) to satisfy given design brief(s)/need(s). The design brief(s)/need(s) should contain requirements against which the final manufactured product(s) can be measured. Students will also test their practical outcome(s) to check their quality and performance.

Students should use **a range** of materials and/or components/ingredients, techniques and processes when manufacturing **a range** of products in order to build and develop a variety of skills and lay a foundation for more complex and challenging work in the future.

The design brief(s)/need(s) should be set by the teacher to ensure a range of materials and/or components/ingredients, techniques and processes is used.

What students need to evidence:

1 Production plan Students should produce a detailed production plan that explains the sequence of operations carried out during the manufacture of their product(s).

Students should produce a work order or schedule which could be done in the form of a flow chart or table. The work order should include the order of mixing/combining, equipment and processes to be used during manufacture.

Students should identify quality control points, and quality checks should be described, this could be done as part of a flow diagram. Safety checks should also be part of the planning.

An important part of planning is the use of time, so students should make sure that they consider realistic timings and deadlines. Where Gantt or time charts are used, students must make sure that they are detailed, cover all aspects of product manufacture and include achievable deadlines.

Consideration should be given to the scale of production of their product(s). Although students may be making one-off products, most products would be batch or mass produced, so they should consider the consequences of these scales in their planning, developing their awareness of commercial production.

2 Making

Students should produce **one or more** high-quality products that meet the requirements of the design brief(s)/need(s) they have been given. The design brief(s)/need(s) should contain requirements against which the final manufactured product(s) can be measured. It is important when setting design requirements, that they can be tested. Requirements may include viscosity testing, comparison work to identify which products influence the desired outcome/finish of the product, show how ratio and proportioning affect preparation, experiment with food materials to show how temperature may affect tolerances, finishes etc which are all objectively measurable requirements that can be tested for success.

Throughout their making activities, students should demonstrate their knowledge and understanding of a range of materials and/or components/ingredients, techniques and processes by selecting and using those that are appropriate to the requirements of the task. Students should consider properties and working characteristics of materials and/or components/ingredients and the processes used to manipulate them. Students should be able to justify their selections by giving reasons for their choices.

Students must work with a variety of materials and/or components/ingredients, techniques and processes, in order to develop high quality skills by applying their knowledge and understanding of a range of materials and/or components/ingredients, techniques and processes. It is likely that they will produce more than one practical outcome during this unit.

In order to achieve well in this assessment, students must show demanding and high-level making skills. Therefore, it is important that manufacturing tasks provide enough complexity and challenge to allow them to demonstrate their skill levels to the full. It is important to keep in mind, too, that the manufacturing tasks set in this unit should be designed to develop skills in students that they can call upon in their A2 coursework project. A single manufactured project that embodies a range of materials and/or components/ingredients, techniques and processes that students can learn from, can be as valid as two or three shorter but equally demanding exercises. However, by setting different exercises, the use of a range of materials and/or components/ingredients, techniques and processes can be assured.

Manufacturing a range of meringue pastries (Meringue Chantilly) can be as demanding as producing a lemon meringue pie and replicating an existing Baked Alaska, can teach students all they need to know about the preparation of ingredients for successful meringue making, scientific principles behind the egg whites increasing in volume, the role of protein in the structure of the meringue and the practical skills involved in the forming, drying and presentation of the end product.

Students will use a variety of skills and processes during their making activities.

Students should be aware of the risks involved in using specific equipment and processes throughout their making and should take appropriate precautions to minimise those risks.

As proof of the quality of students' making skills (and the level of demand of their work), photographs of their work must be evidenced to show that the product(s) is complete, expertly made and well finished. The photographs must show clearly any details of advanced skills, technical content, levels of difficulty and complexity of construction, so students can achieve the marks they deserve.

It is unlikely that a single photograph for each product will be enough to communicate all of the information required, so it will be better to take a series of photographs. These should highlight the processes used and provide examples of precision and attention to detail that may not be otherwise noticed.

3 Testing

After making their product(s), students should carry out tests to check their fitness for purpose.

Students' finished product(s) should be tested under realistic conditions to decide on their success, in order to check the performance and quality of the final product(s).

Students should describe in detail any testing carried out and justify this by stating what they are testing and why they are doing so.

Tests should be carried out objectively, and it would be beneficial to involve potential users so that students can receive reliable and unbiased third-party feedback.

Well-annotated photographic evidence is a very good tool to use when describing the testing process.

1.6 Assessment criteria

Assessment criteria		Level of response	Mark range
Product investigation	A. Performance analysis (AO1)	Fully justify key technical specification points that relate to form, function, user requirements, performance requirements, materials and/or components/ingredients requirements, scale of production and costs. Compare and contrast one other existing similar product using the technical specification.	4-6
		Identify with some justification a range of realistic and relevant specification points that include reference to form, function and user requirements.	1-3
	B. Materials and/or components/ingredients (AO1/AO2)	Suggest, with reference to quality and performance, alternative materials and/or components/ingredients that could have been used in the product. Evaluate, using advantages and disadvantages, the selection of the materials and/or components/ingredients used. Describe the impact on the environment of using the materials and/or components/ingredients identified.	7-9
		Describe a range of useful properties that relate to the materials and/or components/ingredients identified and justify their selection and use in the product. Identify alternative materials and/or components/ingredients that could have been used in the product.	4-6
		Identify a material or component/ingredient used in the product. Describe a useful property of that material or component/ingredient and justify its use.	1-3
	C. Manufacture (AO2)	Evaluate, using advantages and disadvantages, the selection of the manufacturing processes used in the product. Suggest one alternative method of production that could have been used in the manufacture of the product. Describe the impact on the environment of using the processes identified in the production of the product.	7-9
		Describe a range of processes used in the manufacture of the product and fully justify their use for the level of production of the product.	4-6
		Identify, describe and justify the use of a manufacturing process used in the construction of the product.	1-3
	D. Quality (AO2)	Describe a range of quality control checks used during the manufacture of the product and explain how the main relevant standards influenced the manufacture of the product. Describe a quality assurance (QA) system for the product.	4-6
		Identify, describe and justify the use of one quality control check during the manufacture of the product.	1-3

Assessment criteria		Level of response	Mark range
Product design	E. Design and development (AO1/AO2)	Present alternative ideas that are workable, realistic and detailed and which fully address the design criteria. Ideas demonstrate detailed understanding of materials and/or components/ingredients, processes and techniques. Produce a final design proposal that is significantly different and improved compared to any previous alternative design ideas. The design proposal includes technical details of materials and/or components/ingredients, processes and techniques. Making is used to test important aspects of the final design proposal. The final design proposal is evaluated objectively against the design criteria in order to fully justify the design decisions taken.	13-18
		Present realistic alternative design ideas. Ideas are detailed and address most design criteria. Developments are appropriate and use details from ideas to change, refine and improve the final design proposal. A final detailed design proposal is presented. Making is used to test some aspects of the final proposal against relevant design criteria. Evaluative comments objectively consider some aspects of the design brief(s)/need(s).	7-12
		Present simplistic alternative design ideas. Ideas are superficial and address limited design criteria. Developments are minor and cosmetic. A basic final design proposal is presented. Simple making technique is used to test an aspect of the design proposal. Evaluative comments are subjective and superficial.	1-6
	F. Communicate (AO1/AO2)	Use a range of communication techniques and media including ICT, with precision and accuracy to convey enough detailed and comprehensive information to enable third-party manufacture of the final design proposal. Annotation provides explanation and most technical details of materials and/or components/ingredients and processes with justification.	9-12
		Use a range of communication techniques, including ICT, that are carried out with sufficient skill to convey an understanding of design and develop intentions and construction details of the final design proposal. Annotation provides explanation and most technical details of materials and/or components/ingredients and process selection.	5-8
		Use a limited range of communication techniques carried out with enough skill to convey some understanding of design and develop intentions. Annotation provides limited technical details of materials and/or components/ingredients and processes.	1-4

Assessment criteria		Level of response	Mark range
Product manufacture	G. Production plan (AO2)	Produce a detailed production plan that considers stages of production in the correct sequence, realistic time scales and deadlines for the scale of production.	4-6
		Produce a limited production plan that considers the main stages of manufacture, reference to time and scale of production.	1-3
	H. Making (AO2)	Demonstrate a detailed understanding and justified selection of a range of appropriate materials and/or components/ingredients and processes. Demonstrate demanding and high quality making skills and techniques. Show accuracy and precision when working with a variety of materials and/or components/ingredients, processes and techniques. High-level safety awareness is evident throughout all aspects of manufacture.	13-18
		Demonstrate a good understanding and selection of an appropriate range of materials and/or components/ingredients and processes. Demonstrate competent making skills and techniques appropriate to a variety of materials and/or components/ingredients and processes. Show attention to detail and some precision. Demonstrate an awareness of safe working practices for most specific skills and processes.	7-12
		Demonstrate a limited understanding and selection of a narrow range of materials and/or components/ingredients and processes. Use limited making skills and techniques. Demonstrate little attention to detail. Demonstrate an awareness of specific safe working practices during product manufacture.	1-6
	I. Testing (AO2)	Describe and justify a range of tests carried out to check the performance or quality of the product(s). Relevant, measurable points of the design brief(s)/need(s) are objectively referenced. Third-party testing is used.	4-6
		Carry out one or more simple tests to check the performance or quality of the final product(s). Some points of the design brief(s)/need(s) are referenced superficially. Test results are recorded and are subjective.	1-3
	TOTAL NUMBER OF MARKS AVAILABLE		

1.7 Administration

- 1 Internal standardisation** Teachers must show clearly how the marks have been awarded in relation to the assessment criteria. If more than one teacher in a centre is marking students' work, there must be a process of internal standardisation to ensure that there is consistent application of the assessment criteria.

- 2 Authentication** All candidates must sign an authentication statement. Statements relating to work not sampled should be held securely in your centre. Those which relate to sampled candidates must be attached to the work and sent to the moderator. In accordance with a revision to the current Code of Practice, any candidate unable to provide an authentication statement will receive zero credit for the component. Where credit has been awarded by a centre-assessor to sampled work without an accompanying authentication statement, the moderator will inform Edexcel and the mark will be adjusted to zero.

- 3 Further information**

For more information on annotation, authentication, mark submission, moderation procedures and electronic portfolios, please refer to the *Edexcel Information Manual* document, which is available on the Edexcel website.

For up-to-date advice on teacher involvement, malpractice and plagiarism, please refer to the *Joint Council for Qualifications (JCQ) Instructions for Conducting Coursework* document. This document is available on the JCQ website: www.jcq.org.uk.

For additional information on malpractice, please refer to the latest *Joint Council for Qualifications (JCQ) Suspected Malpractice in Examinations and Assessments: Policies and Procedures* document, available on the JCQ website.

2.1 Unit description

In this unit students will develop a knowledge and understanding of a wide range of materials, components, additives and processes used in the design and production of food products. It is important for students to learn about the main food components, their physical nature and working properties. Similarly, students need to know the various stages in preparing foods for large-scale production. Students must also learn the principles underpinning food preservation and the various techniques involved.

Quality of food is of major importance to the manufacturer and consumer. It is therefore essential for students to understand the principles of food quality control and good manufacturing practice in the food industry.

The unit content is divided into three sections, with each section outlining the specific knowledge and understanding required by the student. Specific materials and processes are named and these are the only examples with which students need to be familiar for this examination.

2.2 Assessment information

The assessment of this unit is through a 1 hour 30 minute examination paper set and marked by Edexcel.

The paper will be a question and answer booklet and all questions in the paper are compulsory.

The paper will consist of short-answer and extended-writing type questions.

The total number of marks for the paper is 70.

2.3 Materials, components/ingredients and working properties

What students need to learn:

- 1 Carbohydrates
 - a) **The chemical name, nature and basic characteristics of the following carbohydrates. Students do not need to know the chemical structures and complex formulae.**
 - Sugars
 - ◆ monosaccharides
 - ◆ glucose
 - ◆ fructose
 - ◆ disaccharides
 - ◆ maltose
 - ◆ sucrose
 - ◆ lactose.
 - Reducing sugars.
 - Simple polysaccharides
 - ◆ starch
 - ◆ amylose
 - ◆ amylopectin
 - ◆ glycogen
 - ◆ cellulose.
 - Complex polysaccharides
 - ◆ xanthan
 - ◆ alginate
 - ◆ carrageen
 - ◆ guar
 - ◆ pectins.
 - Fibre.
 - Carbohydrates in the diet.

b) Fundamental working properties of carbohydrates:

- sweetening: comparison of the sweetness level of sugars compared with sucrose
- thickening/gelatinisation
 - ◆ importance of hydrogen bonding in gelatinisation
 - ◆ retrogradation and syneresis
- stabilising
 - ◆ use of cellulose and gums in stabilising food products
- browning reactions
 - ◆ caramelisation
 - ◆ Maillard reaction.

2 Fats

a) The chemical nature and basic characteristics of the following fats. Students do not need to know the chemical structures and complex formulae.

- Simple fats
 - ◆ natural fats
 - ◆ mixed triglycerides
 - ◆ saturated fatty acids
 - ◆ monounsaturated fatty acids (MUFA)
 - ◆ polyunsaturated fatty acid (PUFA).
- Monoglycerides.
- Diglycerides.

b) The basic characteristics of:

- essential fatty acids in the diet
- vegetable fats and oils
- animal fats
- fish oils.

c) Fundamental working properties of:

- hardening fats and oils by hydrogenation
- essential fatty acids in the diet
- monoglycerides and diglycerides used as emulsifying agents
- rancidity
 - ◆ hydrolytic
 - ◆ oxidative.

3 Proteins

a) The nature, classification and basic characteristics of the following proteins. Students do not need to know the chemical structures and complex formulae.

- Protein types by function
 - ◆ structural
 - ◆ physiologically active
 - ◆ nutrient.
- Primary, secondary and tertiary structures.
- Amino acids
 - ◆ neutral
 - ◆ basic
 - ◆ acidic.
- Essential amino acids in the diet
 - ◆ biological value.

b) Fundamental working properties of:

- iso-electric point as a pH
- coagulation by:
 - ◆ heat
 - ◆ acid
 - ◆ mechanical action
 - ◆ enzymes
- denaturation
- involvement in browning reactions.

4 Other components and additives

a) Sensory characteristics

Name, nature, functional properties and use of the following additives which affect the characteristics of foods under the following.

(i) Colours:

- artificial
- natural pigments.

(ii) Flavours:

- natural
 - ◆ spices and herbs
- nature identical
- synthetic
- flavour enhancers/modifiers:
 - ◆ monosodium glutamate (MSG).

b) Physical characteristics

Name, nature, functional properties and use of the following additives which affect the characteristics of foods under the following.

(i) Emulsifying agents and their function:

- emulsifiers in oil and water emulsions
- emulsifiers in retarding staling in bakery goods.

(ii) Gelling agents and their function:

- gels
 - ◆ starch-based
 - ◆ protein-based
 - ◆ gums
 - ◆ pectins.

(iii) Stabilisers:

- stabilising agents
 - ◆ carbohydrate-based
 - ◆ hydrocolloids
 - ◆ gums
- stabilisers used for binding-up water
- gums.

c) Storage characteristics

Name, nature, functional properties and use of the following additives which affect the characteristics of foods under the following.

(i) Preservatives:

- sorbic acid
- benzoic acid
- sulphur dioxide
- potassium nitrite.

(ii) Antioxidants:

- absorbing oxygen
- forming stable free radicals.

d) Additives affecting nutritional characteristics

Name, nature, functional properties and use of the following additives which affect the characteristics of foods under the following.

- Food fortification:
 - ◆ nutrients involved.

e) Additives used as aids to processing

Name, nature, functional properties and use of the following additives which affect the characteristics of foods:

- solvents
- anti-caking agents
- sequestrants.

2.4 Industrial and commercial practice

What students need to learn:

1 Preparation

Stages in the commercial manufacture of food products, the basic principles of each process and its application:

- cleaning
 - ◆ dry cleaning methods
 - ◆ wet cleaning methods
- peeling
 - ◆ steam
 - ◆ abrasion
 - ◆ lye systems
- sorting
 - ◆ by weight
 - ◆ colour
 - ◆ physical size
- grading
 - ◆ quality separation
- size reduction
 - ◆ pulping
 - ◆ slicing
 - ◆ dicing
 - ◆ milling
 - ◆ grinding
 - ◆ shredding
 - ◆ chopping
- mixing
 - ◆ methods for solids
 - ◆ tumbler
 - ◆ ribbon blender
 - ◆ methods for liquids
 - ◆ propellerz
 - ◆ blade
 - ◆ homogenisation
- blanching
 - ◆ steam blanching for vegetables
 - ◆ water blanching for vegetables.

2 Underlying microbiological principles

a) The nature and application of microbiology under the following.

- Types of organisms involved:
 - ◆ bacteria
 - ◆ moulds
 - ◆ yeasts.
- Bacterial lifecycle.
- Food spoilage.
- Food poisoning.
- Kitchen hygiene.
- Personal hygiene.
- Food hygiene.

b) The following factors that influence the growth of micro-organisms and their application to food preservation:

- nutrients
- pH
- temperature
- oxygen
- time
- water activity.

3 Preservation processes

Nature, processes, application and effects of food products of the following techniques to food preservation:

- heat in reducing the numbers of micro-organisms
 - ◆ pasteurisation
 - ◆ sterilisation
 - ◆ aseptic techniques
 - ◆ canning
- removal or binding of water
 - ◆ evaporation
 - ◆ drying
 - ◆ tunnel drying
 - ◆ spray drying
 - ◆ accelerated freeze drying
 - ◆ effect of salt and sugar
- chemical methods
 - ◆ acids
 - ◆ preservatives
- removal of heat in
 - ◆ chilling
 - ◆ freezing
 - ◆ immersion
 - ◆ blast
 - ◆ plate
 - ◆ cryogenic systems (liquid nitrogen)
- computer control of process
 - ◆ process control and automation
 - ◆ automated production lines
- packaging, choice of materials for individual food products and distribution
 - ◆ packaging materials:
 - ◆ glass
 - ◆ metal
 - ◆ paper/cardboard
 - ◆ plastic
 - ◆ cellulose films
 - ◆ storage and distribution systems
 - ◆ controlled atmosphere
 - ◆ refrigerated.

2.5 Quality

What students need to learn:

1 Good manufacturing practice

The principles and application of good manufacturing practice when manufacturing chilled, frozen, canned and dried food products.

- Quality control.
- Quality assurance.
- Producing product specifications
 - ◆ raw material procurement
 - ◆ manufacturing processes
 - ◆ product inspection
 - ◆ distribution to consumers.
- Risk assessment/hazard analysis and critical control points (HACCP).
- Food safety acts
 - ◆ The Food Safety Act 1990
 - ◆ The Food Safety (General Food Hygiene) Regulations 1995.

3.1 Unit description

In this unit students will develop a knowledge and understanding of a range of food commodities, aspects of nutrition, product development and food innovation. It is essential for students to have a comprehensive knowledge of the main food commodities, their composition, basic processing and typical spoilage patterns.

A sound knowledge of nutrition is particularly important for food technologists and its influence on the diet, contemporary lifestyle issues and new product development. Similarly, consumer behaviour, demographics, modern lifestyles and sustainable issues have an influence on new product development. It is also important for students to be aware of the influence of new technologies and materials on the development of new food products.

The unit content is divided into three sections, with each section outlining the specific knowledge and understanding required by the student. Specific examples are given and these are the only ones with which students need to be familiar for this examination.

3.2 Assessment information

The assessment of this unit is through a 2-hour examination paper set and marked by Edexcel.

The paper will be a question and answer booklet and all questions in the paper are compulsory.

The paper will consist of short-answer and extended-writing type questions.

The total number of marks for the paper is 70.

3.3 Food commodities, chemical composition and application of manufacturing processes

What students need to learn:

1 Meat and fish

a) Characteristics, structural composition and factors affecting:

- the component proteins (actin, myosin and actomyosin) to form muscle
- muscle contraction
- conversion of muscle to form meat
- fish quality.

b) The characteristic spoilage in:

- putrefaction of meat
- breakdown of fish tissues after catching
- development of odours.

c) The processes involved in:

- storage and handling of meat
- meat preservation
 - ◆ canning
 - ◆ freezing
- fish preservation
 - ◆ chilling
 - ◆ freezing.

d) Nutritional contribution to the diet.

2 Dairy products

a) Characteristic, composition and factors affecting:

- proteins in milk
 - ◆ caseins
 - ◆ whey proteins
 - ◆ lactalbumin
 - ◆ lactoglobulin
- lactose content.

b) Processes involved and reasons for:

- milk processing
 - ◆ pasteurisation
 - ◆ homogenisation
 - ◆ sterilisation.

c) The processes used to produce:

- dried milk
- evaporated and condensed milk
- skimmed milk
- cheese
- butter
- yoghurt
- ice cream.

d) The characteristic changes in:

- the souring of milk
- mould attacks on cheese.

3 Fruit and vegetables**a) The characteristic composition and behaviour of:**

- climacteric and non-climacteric fruits
 - ◆ changes during storage and ripening
 - ◆ temperature
 - ◆ controlled atmosphere
 - ◆ presence of ethylene
 - ◆ atmospheric pressure
 - ◆ storage temperatures for tropical products.

b) The processes involved in the following for fruit and vegetables:

- dehydration
- juice extraction
- pickling
- preserve-making.

c) The characteristic spoilage caused by the following:

- chill injury
- rotting.

4 Eggs**a) The physical structure and factors affecting quality.****b) Nature of egg proteins.****c) Processing of eggs to make:**

- frozen whole egg
- dried egg.

5 Sugar

The processes of:

- production from sugar cane and sugar beet
- refining.

6 Fermented products

The processes involved in producing:

- beer
 - ◆ malting
 - ◆ mashing
 - ◆ fermentation
- wine
 - ◆ red, white and rosé
 - ◆ fermentation
 - ◆ fortified.

7 Cereals

a) The composition and structure of:

- wheat
- rice
- rye.

b) The processes involved in:

- wheat milling
- bread making
- malting
- cake making
- biscuit making
- pasta making.

3.4 Nutrition

What students need to learn:

1 Human nutrition and diet

The importance and influence on human nutrition and diet of:

- the provision of energy
 - ◆ energy values of protein (4kcal/17kJ), fat (9kcal/37kJ) and carbohydrate (3.75kcal/16kJ)
 - ◆ energy balance
 - ◆ use of energy in the body
 - ◆ basal metabolic rate (BMR)
- the supply of macro- and micro-nutrients.

2 Digestive system

Key components and enzymes in the digestive system, their importance and how they work.

- Mouth
 - ◆ mucin
 - ◆ salivary amylase.
- Stomach
 - ◆ pepsin
 - ◆ acid
 - ◆ rennin.
- Small intestine
 - ◆ pancreatic juice
 - ◆ trypsin and chymotrypsin
 - ◆ lipase
 - ◆ pancreatic amylase
 - ◆ bile
 - ◆ peptidases.
- Large intestine
 - ◆ absorption.

3 Nutritional recommendations and terminology

An understanding, advantages/disadvantages and uses of the following nutritional recommendations and terminology:

- dietary reference values (DRVs)
 - ◆ estimated average requirement (EAR)
 - ◆ reference nutrient intake (RNI)
 - ◆ lower reference nutrient intake (LRNI)
- guideline daily amounts (GDAs)
- population average figures.

4 Contribution of nutrients and constituents of food to the diet

An understanding, use and contribution to the diet of:

- carbohydrate
- protein
- fat
- vitamins
 - ◆ A
 - ◆ B1
 - ◆ B2
 - ◆ C
 - ◆ D
 - ◆ E
 - ◆ K
- Minerals
 - ◆ calcium
 - ◆ iron
 - ◆ sodium
 - ◆ potassium
 - ◆ phosphorus
 - ◆ iodine
 - ◆ zinc
- fibre
- water.

5 Contemporary issues

An awareness and implications of the following contemporary issues:

- five a day (fruit and vegetables)
- sustainability of food supplies
 - ◆ 'food miles'
 - ◆ biodegradability of packaging materials
- diet-related diseases
 - ◆ coronary heart disease
 - ◆ obesity
- special diets
 - ◆ vegetarian
 - ◆ ethnic and religious avoidance
 - ◆ reduced calorie
 - ◆ coeliac
 - ◆ lactose intolerant
 - ◆ diabetics.

3.5 Product development and food innovation

What students need to learn:

1 Product development

a) The nature and impact of the following factors that influence new product development and food innovation to the individual consumer:

- characteristics
- lifestyles related to buying food
- demographics
- cultural influences
- 'eating events' affecting product purchases
- concept of 'grazing'
- importance of snack foods in modern lifestyle.

b) The concept of product life cycle and factors influencing:

- stages in the life cycle
- marketing plans.

c) The factors that influence the generation of new product ideas:

- social trends
- cultural changes
- legislation
- business confidence
- market niche
- competition
- food scares
- technological development.

d) The nature, application, advantages/disadvantages and influence of the following new technologies on the development of new food products:

- encapsulation technology
- products of biotechnology
- genetic modification.

e) The application, influence and function of the following new materials on the development of new food products:

- modified starches
- novel proteins/meat analogies
- encapsulation.

4.1 Unit description

In this unit, students are given the opportunity to apply the skills they have acquired and developed throughout this course of study, to design and make a food product of their choice.

In this unit, students are encouraged to be creative and adventurous in their work. There are no limits to project selection beyond the time and resources available and the appropriateness of selection in matching individual students' potential. Students are expected to take ownership of all aspects of their work in this unit, in order to allow them total control of their responses and to target assessment criteria effectively, and to maximise their achievements.

In order to reach high attainment levels, students must adopt a commercial design approach to their work, reflecting how a professional might deal with a design problem and its resolution.

The choice of design problem should have a real commercial use, in that it should be useful to a wider range of users beyond an individual, unless it has been specifically commissioned as a 'one-off'. The design problem should provide opportunities for a client or user-group to have input into decision making at various stages of the design and make process.

A client or user-group is defined as any third party identified by a student, that is referred to and which can give informed critical feedback at various stages throughout the design process. Clients and user-groups do not need to be specialists or experts; they can be drawn from any relevant group of people and may include other students, friends or family members.

A key feature of this unit is for students to consider issues related to sustainability and the impact their product may have on the environment. A student may choose to design and make a sustainable product, but if they do not, they should still consider the issues of sustainability at relevant points in their designing and making activities. Sustainable issues could include materials, components/ingredients production and selection, manufacturing processes, use of the product and its disposal/recycling.

4.2 Assessment information

1 Design and make process

- Students identify a client/user-group from which they must design and make a product that meets the original design problem. They should liaise with their client/user-group at various stages of their designing and making process in order to develop a commercial product.
- Students should be familiar with a range of industrial applications and commercial working practices in order to fulfil the requirements of this unit.
- This unit results in the development of a manufactured product supported by a design folder. The folder, which should include ICT-generated images where appropriate, should be submitted on A3 paper **only** and is likely to be no more than 30 pages long.
- It is important that all stages of the manufacturing process are photographed in order to evidence that the product is complete, expertly made and well finished. It is unlikely that a single photograph will be enough to communicate all of the information required. Students must ensure that a series of photographs is taken during making to show clearly any details of advanced skills, technical content, levels of difficulty and complexity of construction. This will allow students to achieve the marks they deserve.

2 Task setting guidance

Although there is a free choice of product, students must ensure that:

- time and resources available are considered
- they can fully demonstrate their capabilities in each of the assessment criteria, so that they maximise their potential achievements
- the choice of design problem has a commercial use and should allow designing for a client or user-group who should have input into decision making at various stages in the design and make process
- issues related to sustainability are considered at relevant points in their designing and making activities and the impact their product may have on the environment. Sustainable issues could include materials, components/ingredients production and selection, manufacturing processes, use of the product and its disposal/recycling
- their product complies with the requirements of a food technology product.

3 Assessment guidance

- This unit is internally set and marked by the centre, using the assessment criteria in Section 4.4, and externally moderated by Edexcel.
- The maximum number of marks available is 90.
- It is important that all stages of the manufacturing process are photographed in order to evidence that the product is complete, expertly made and well finished. Students must ensure that photographs show clearly any details of advanced skills, technical content, levels of difficulty and complexity of construction, so that they can achieve the marks they deserve.
- It is unlikely that a single photograph will be enough to communicate all of the information required, so it will be better to take a series of photographs during making.
- This unit results in the development of an appropriate product supported by a design folder. The folder, which should include ICT-generated images where appropriate, should be submitted on A3 paper **only** and is likely to be no more than 30 pages long.
- Students can submit their work electronically for moderation. Please refer to the *Edexcel Information Manual* document, which is available on the Edexcel website www.edexcel.com, for further detail.

4.3 Product design and make

What students need to evidence:

1 Research and analysis

Once the student has identified an appropriate need and written a detailed design brief(s)/need(s), they must analyse the need in order to focus on the research needed to help the work progress. Students should use a range of research strategies to gather useful and relevant information that will help with their designing and making activities.

When gathering information, it is important that students are clear about what they need to find out. Research should be highly selective ensuring that the information gathered is useful and relevant to the client/user-group's needs identified and finalised during analysis. Research should be focused and succinct and contain no worthless padding. Students should avoid downloading large amounts of information from the internet, or cutting and pasting from catalogues and databases without providing detailed annotation to explain the selected information. Primary research is usually of greater value than secondary research and selectivity is important.

A good starting point for research and analysis could include an interview or discussion with the client/user-group to establish their thoughts and preferences regarding the proposed project. This information should be used to guide their analysis and research activities. In the analysis, students should ensure that they focus closely on the identified need, avoiding any general statements that are of no use and could be applied to any design situation.

Research could include the analysis of existing similar products, to find out about materials, and/or components/ingredients, processes and construction methods used in commercial manufacture. Surveys or questionnaires should be designed carefully, avoiding questions that are general and useless in helping with the design process. A questionnaire should not be included simply for the sake of doing so; its use and questions asked within it should be justified.

When researching into materials and/or components/ingredients and processes, students should take into consideration the concept of 'sustainability' so that they are able to make responsible and informed decisions about the impact of materials and/or components/ingredients and resources upon the environment. When all information gathering has been completed, students should analyse their research in order to help write a product specification that is relevant, meaningful and measurable.

2 Product specification

It is important that students develop and write a detailed specification, as it will be used throughout the design process to reference ideas and their development and to check that the design requirements and client/user-group needs are being matched. The specification should be used as a basis for testing and evaluating the completed product and any future modifications suggested should be referenced to specification criteria in order to check the success of the final product.

The starting point for a successful specification should be after the research and when essential requirements have been established as a result of studying the information gathered. Students should consult with their client/user-group to agree the specification points and to ensure that the criteria meet the needs identified earlier. When specifying materials and/or components/ingredients and processes, students should consider sustainability, and make decisions based on the environmental costs of extracting, producing and processing the selected materials and/or components/ingredients, the product manufacture, lifespan and disposal.

When writing a specification, students should try to avoid a rambling collection of points. The specification should be informed by the research findings. An effective specification is organised logically and could be achieved by using sub-headings such as purpose, form, function, user requirements, performance requirements, materials, components/ingredients, size, safety and quality, scale of production and cost. Each specification point should contain more than a single piece of information, so that each statement is fully justified by giving a reason for the initial point. For example, it is not sufficient to say 'the product should be low in fat and contain no more than 4 per cent fat per portion', as this is not justified until 'because a greater fat percentage raises the product beyond what is considered to be an acceptable fat content' is added.

Specification points should be technical and measurable where possible, so that testing and evaluation can be realistic. It is extremely important that specification points are not superficial or general.

3 Design and development

a) Design

In this section, students have the opportunity to apply their design skills and the advanced knowledge of materials and/or components/ingredients, processes and techniques developed through their experience of AS units to produce alternative designs that address client/user-group needs as identified in the specification.

Students should produce alternative design ideas that are realistic, workable, and which address the needs identified in the specification. Designs should be annotated and include as much detail as possible of materials and/or components/ingredients, processes and techniques that could be used to construct the design idea.

It is often, but not always, necessary for students to produce complete products when considering alternative design ideas. It is better to focus on fewer and more detailed high quality designs than to try to produce more work of a lower quality. As work progresses, alternative design proposals and their details should become linked and continuity of ideas should be seen as one idea moves to the next to be improved upon.

b) Review

As an important part of their designing, students should review and objectively evaluate their design ideas as they are produced. The comments made in reviewing design ideas should be based on objective, formative evaluation of each idea and should always be referenced to the specification and to check the idea's potential in fulfilling the client/user-group's need.

Students should use 'tick-boxes' with care when reviewing design ideas, as this is always subjective and worthless in evaluating ideas against a specification effectively. Yes/no answers do not allow any useful decisions to be made when deciding whether specification points have been met.

As part of reviewing, design ideas should be discussed with the client/user-group to ensure, through feedback, their suitability for their intended purpose. Information should be communicated through logical and well-organised statements, using specialist technical vocabulary. In addition, students should consider and justify some of their design decisions with reference to sustainability. If organoleptic evaluations are included, they must not replace evaluations against specification points.

c) Develop

In this section, students will develop a final design proposal in consultation with their client/user-group. Development of the final design proposal will give students the opportunity to bring together the best and most appropriate features of their initial design ideas into a refined final design proposal that meets all of the requirements of the product specification and matches the client/user-group needs.

Students must show the development of their design, demonstrating how it has changed and moved on from initial ideas, using the results of review/evaluation and client feedback. It is not good practice to simply take an initial idea, make superficial or cosmetic changes, and then present it as a final developed proposal.

Students should include as much detailed information on all aspects of the developed design as possible, including technical details of materials and/or components/ingredients and their selection, processes and techniques.

This is an opportunity to demonstrate an advanced knowledge and understanding of design and make activities.

Modelling should be used to test features such as proportions, scale, function, sub-systems, organoleptic acceptability etc. Modelling can be achieved only through experimental work, making samples and/or making completed products. This evidence should be presented through clear, well-annotated photographs. Consultation with the client/user-group should be evidenced in order to justify and clarify final design details.

d) Communicate

When presenting design and development work, it is essential that ideas are communicated effectively:

Through design and development work

Students should show evidence of 'design thinking' using any form of effective communication that they feel is appropriate. However, they should try to use a range of skills that may include freehand sketching, cut and paste techniques, ICT photography etc. It is important to demonstrate a high degree of presentation, which will be shown through the accuracy and precision of their work.

When using ICT, students should ensure that it is used appropriately. For example, nutritional analysis should be used only if applicable to students' ideas.

Through the quality of written communication

Annotation should be used to explain design details and convey technical information. Students should make sure that the information is easily understood and presented logically.

Specialist technical vocabulary should be used consistently with precision.

Information presented in this section should enable a student's design thinking and manufacturing intentions to be clearly understood by others and allow third-party manufacture of the final design proposal.

Photographic evidence should be provided to wholly demonstrate the development process and the student's making, finishing and presentation skills.

4 Planning

In this section, students will produce a detailed production plan that explains the sequence of operations carried out during the manufacture of their product under the appropriate commercial conditions and which focuses closely on the identified scale of production.

Students should produce a work order or schedule to illustrate the sequence of operations used during manufacturing. This could be evidenced in the form of a flow chart or table. The work order should include the order of mixing/combining, equipment and processes to be used during manufacture in volume higher than 'one-off' production unless the designed product is specifically a one-off item. Details of cost, scales, opportunities and constraints in an appropriate commercial manufacturing should be shown.

An important part of planning is the use of time, so students must ensure that they consider realistic timescales and deadlines. Where Gantt or time charts are used, students must ensure that they are detailed, cover all aspects of manufacture and include achievable deadlines.

Students should identify quality control points and quality checks should be described. This could be done as part of a flow diagram. Safety checks should also be included as part of planning. Hazard analysis and critical control points (HACCP), quality control (QC) and quality assurance (QA) should be specific to the final product development.

5 Making

a) Use of equipment

Students should demonstrate their ability to use equipment with high levels of skill and accuracy and to select appropriate equipment for specific purposes. It is important that students use a range of equipment to allow them to fully demonstrate their skills.

Students should work safely and be fully aware of the risks involved when using equipment and the precautions that should be taken to minimise those risks. Health and safety issues and inherent risks pertinent to food handling or production should be acknowledged.

b) Quality

During manufacturing activities, students should demonstrate their understanding of a range of materials and/or components/ingredients and their working properties. Students should select and justify the use of materials and/or components/ingredients that are appropriate to the needs of the product and match the requirements of the product specification. When selecting materials and/or components/ingredients, students should be able to justify their choice by referring to their properties and suitability for their intended use. The selection and use of appropriate processes and techniques should enable students to produce a high quality final product that fully matches the final design proposal in all respects.

It is important that all stages of the manufacturing process are photographed in order to evidence that the product is complete, expertly made and well finished. Students must ensure that photographs show clearly any details of advanced skills, technical content, levels of difficulty and complexity of construction, so that they can achieve the marks they deserve.

It is unlikely that a single photograph will be enough to communicate all of the information required, so it will be better to take a series of photographs during the making of their final product.

c) Complexity/level of demand

Students must demonstrate demanding and high-level making skills in order to achieve high marks. Therefore, it is very important that the manufacture and finishing of the product offers enough complexity and challenge in order to gain the maximum credit possible.

The level of complexity of the intended final product will already have been established through the finalisation of the design proposal, so it is important that students consider this at an early stage to maximise their potential when manufacturing the product.

Students should try to set challenges and demands appropriate to their skill levels and beyond, so that they do not work within their comfort zone and fail to achieve what they are capable of.

Students should avoid producing simplistic and undemanding work that, however well it is manufactured using appropriate equipment and processes, is unchallenging. This approach cannot result in high levels of credit.

6 Testing and evaluating

When students have completed the manufacture of their final product, they should carry out tests to check its fitness for purpose, with reference to commercial techniques where possible.

The finished product should be tested under realistic conditions to decide on its success using the points of specification to check the product's performance and quality. Students should describe in detail any tests they carry out and justify them by stating what is being tested and why. Tests should be objective and carried out by the client/user-group. Involving other potential users would be a reliable way of gathering unbiased and reliable third-party feedback.

Well-annotated photographic evidence is a good tool to use when describing testing. Students should use the results of their testing and views of the client/user-group to help evaluate the final product.

The evaluation should relate to the measurable points of the product specification and should be as objective as possible. Students should use the information from their testing, evaluation and client/user-group feedback to make suggestions for possible modifications and future improvements to the product. Suggestions for modifications should focus on improving the performance of the product, or its quality.

Students should check the sustainability of their final product by carrying out a life cycle assessment (LCA), in order to assess its impact on the environment. Students could use a flow chart similar to the one shown below as a starting point for the LCA of the product and expand upon it.



4.4 Assessment criteria

Assessment criteria		Level of response	Mark range
A. Research and analysis (AO1)		Analysis is detailed with most design needs clarified. Research is selective and focuses on the needs identified in the analysis.	3-4
		Analysis is limited with some design needs clarified. Research is superficial and does not focus on the needs identified in the analysis.	1-2
B. Product specification (AO1)		Specification points are realistic, technical and measurable. Specification fully justifies points developed from research in consultation with a client/user-group. Sustainability of resources is realistically considered and relevant when developing specification points.	4-6
		Specification points are realistic but not measurable. Some specification points are developed from research in limited consultation with a client/user-group, but are not justified. Sustainability of resources is considered superficially when developing specification points.	1-3
C. Design and development	Design (AO1/AO2)	Present alternative design ideas that are realistic, workable and detailed. Ideas demonstrate that detailed understanding of materials and/or components/ingredients, processes and techniques supported by research information. Ideas address all specification points. Client/user-group feedback shown.	7-10
		Present alternative design ideas that are realistic and workable. Ideas are detailed and use relevant research. Ideas address most specification points.	4-6
		Present alternative design ideas that are similar and simplistic. Ideas are similar and use limited research. Limited specification points are addressed.	1-3
	Review (AO1)	Present objective evaluative comments against most specification points that consider client/user-group feedback. Evaluative comments include realistic issues of sustainability relating to design and resources.	3-4
		Present general and subjective comments against some specification points. An aspect of sustainability is evaluated superficially.	1-2

Assessment criteria		Level of response	Mark range
C. Design and development <i>(cont.)</i>	Develop (AO1/AO2)	Development is used to produce a final design proposal that is significantly different and improved compared to any previous alternative design ideas. The final design proposal includes technical details of materials and/or components/ingredients, processes and techniques. Making is used to test important aspects of the final design proposal against relevant design criteria. Client/user-group feedback is used for final modifications.	7-10
		Developments are appropriate and use details from alternative design ideas to change, refine and improve the final design proposal. A final design proposal is presented that includes some details of materials and/or components/ingredients, processes and techniques. Making is used to test some aspects of the final design proposal against relevant design criteria.	4-6
		Developments from alternative design ideas are minor and cosmetic. A final design proposal is presented that includes superficial details of materials and/or components/ingredients, processes and techniques. Simple making technique is used to test an aspect of the final design proposal against a design criterion.	1-3
	Communicate (AO1/AO2)	Use a range of communication techniques and media, including ICT, that are carried out with precision and accuracy to convey enough detailed and comprehensive information to enable a third party to manufacture the final design proposal.	4-6
		Use a range of communication techniques, including ICT, that are carried out with sufficient skill to convey an understanding of design and develop intentions and construction details of the final design proposal.	1-3
	D. Planning (AO2)	Produce a detailed production plan that considers the main stages of manufacture in the correct sequence appropriate to the scale of production. Realistic and achievable timescales and deadlines are evidenced for the scale of production. Quality and safety checks are shown and justified.	4-6
Produce a production plan that considers the main stages of manufacture. Reference to time and scale of production is shown. Quality and safety are evidenced superficially.		1-3	

Assessment criteria		Level of response	Mark range
E. Making	Use of equipment (AO2)	Select equipment for specific uses independently. Use with precision and accuracy. High level of safety awareness, for self and others, when using specific equipment.	7-9
		Select appropriate equipment with some guidance. Use with some skill and attention to detail. Show sufficient levels of safety awareness, for self and others, when using specific equipment.	4-6
		Select general equipment with guidance. Use with limited skill and attention to detail. Show a limited level of safety awareness, for self and others, when using specific equipment.	1-3
	Quality (AO2)	Display a detailed understanding of the working properties of materials and/or components/ingredients used with justification for their selection. Display a justified understanding of the use of manufacturing processes. Produce a high quality final product that matches all aspects of the final design proposal and functions fully.	11-16
		Display a good understanding of the working properties of materials and/or components/ingredients used with relevant reasons for their selection. Display a good understanding of the use of relevant manufacturing processes. Produce a final product that matches the final design proposal and functions adequately.	6-10
		Display a limited understanding of the working properties of materials and/or components/ingredients used with limited reasoning for their selection. Display a limited understanding of the use of manufacturing processes. Produce a final product that barely matches the final design proposal and functions poorly.	1-5
	Complexity/ level of demand (AO2)	The complexity of task is challenging. A wide range of skills is required, demonstrating precision and accuracy in their use.	7-9
		The complexity of task offers some challenge. A range of skills is required demonstrating attention to detail in their use.	4-6
		The complexity of task is undemanding. A limited range of skills is needed that require little attention to detail in their use.	1-3

Assessment criteria	Level of response	Mark range
F. Testing and evaluating (AO2)	A range of tests justified and carried out to check the performance and/or quality of the final product. Objective evaluative comments, including third-party evaluation, consider most relevant, measurable specification points in detail. Suggestions for modifications that are justified from tests carried out focus on improving performance and/or quality of the final product. Relevant and useful life cycle assessment carried out on the final product to check its sustainability.	7-10
	A range of tests carried out to check the performance and/or quality of the final product. Evaluative comments are objective and reference most specification points. Suggestions for modifications are relevant and are justified from tests that were carried out.	4-6
	One or more simple tests carried out to check the performance and/or quality of the final product. Evaluative comments are subjective and reference a few specification points superficially. Suggestions for modifications are cosmetic.	1-3
TOTAL NUMBER OF MARKS AVAILABLE		90

4.5 Administration

- 1 Internal standardisation** Teachers must show clearly how the marks have been awarded in relation to the assessment criteria. If more than one teacher in a centre is marking students' work, there must be a process of internal standardisation to ensure that there is consistent application of the assessment criteria.

- 2 Authentication** All candidates must sign an authentication statement. Statements relating to work not sampled should be held securely in your centre. Those that relate to sampled candidates must be attached to the work and sent to the moderator. In accordance with a revision to the current Code of Practice, any candidate unable to provide an authentication statement will receive zero credit for the component. Where credit has been awarded by a centre-assessor to sampled work without an accompanying authentication statement, the moderator will inform Edexcel and the mark will be adjusted to zero.

- 3 Further information** For more information on annotation, authentication, mark submission, moderation procedures and electronic portfolios, please refer to the *Edexcel Information Manual* document, which is available on the Edexcel website.

For up-to-date advice on teacher involvement, malpractice and plagiarism, please refer to the latest *Joint Council for Qualifications (JCQ) Instructions for Conducting Coursework* document. This document is available on the JCQ website: www.jcq.org.uk.

For additional information on malpractice, please refer to the latest *Joint Council for Qualifications (JCQ) Suspected Malpractice in Examinations and Assessments: Policies and Procedures* document, available on the JCQ website.

D Assessment and additional information

Assessment information

Assessment requirements	For a summary of assessment requirements and assessment objectives, see <i>Section B, Specification overview</i> .
Entering candidates for this qualification	Details of how to enter candidates for the examinations for this qualification can be found in Edexcel's Information Manual, copies of which are sent to all examinations officers. The information can also be found on Edexcel's website (www.edexcel.com).
Resitting of units	<p>There is no limit to the number of times that a student may retake a unit prior to claiming certification for the qualification. The best available result for each contributing unit will count towards the final grade.</p> <p>After certification all unit results may be reused to count towards a new award. Students may re-enter for certification only if they have retaken at least one unit.</p> <p>Results of units held in the Edexcel unit bank have a shelf life limited only by the shelf life of this specification.</p>
Awarding and reporting	<p>The grading, awarding and certification of this qualification will comply with the requirements of the current GCSE/GCE Code of Practice, which is published by the Office of Qualifications and Examinations Regulation (Ofqual). The AS qualification will be graded and certificated on a five-grade scale from A to E. The full GCE Advanced level will be graded on a six-point scale A* to E. Individual unit results will be reported.</p> <p>A pass in an Advanced Subsidiary subject is indicated by one of the five grades A, B, C, D, E of which grade A is the highest and grade E the lowest. A pass in an Advanced GCE subject is indicated by one of the six grades A*, A, B, C, D, E of which Grade A* is the highest and Grade E the lowest. To be awarded an A* students will need to achieve an A on the full GCE Advanced level qualification and an A* aggregate of the A2 units. Students whose level of achievement is below the minimum judged by Edexcel to be of sufficient standard to be recorded on a certificate will receive an unclassified U result.</p>
Performance descriptions	Performance descriptions give the minimum acceptable level for a grade. See <i>Appendix 1</i> for the performance descriptions for this subject.

Unit results

The minimum uniform marks required for each grade for each unit:

Unit 1

Unit grade	A	B	C	D	E
Maximum uniform mark = 120	96	84	72	60	48

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–47.

Unit 2

Unit grade	A	B	C	D	E
Maximum uniform mark = 80	64	56	48	40	32

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–31.

Unit 3

Unit grade	A	B	C	D	E
Maximum uniform mark = 80	64	56	48	40	32

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–31.

Unit 4

Unit grade	A	B	C	D	E
Maximum uniform mark = 120	96	84	72	60	48

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–47.

Qualification results

The minimum uniform marks required for each grade:

Advanced Subsidiary Cash-in code 8FT01

Qualification grade	A	B	C	D	E
Maximum uniform mark = 200	160	140	120	100	80

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–79.

Advanced GCE Cash-in code 9FT01

Qualification grade	A	B	C	D	E
Maximum uniform mark = 400	320	280	240	200	160

Candidates who do not achieve the standard required for a Grade E will receive a uniform mark in the range 0–159.

Language of assessment

Assessment of this specification will be available in English only. Assessment materials will be published in English only and all work submitted for examination and moderation must be produced in English.

Quality of written communication

Students will be assessed on their ability to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate

Units 1–4 assess students on quality of written communication.

Assessment objectives and weighting

		% in AS	% in A2	% in GCE
AO1	Students 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.	39%	52%	45.5%
AO2	Students 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.	61%	48%	54.5%
TOTAL		100%	100%	100%

Synoptic assessment

In synoptic assessment there should be a concentration on the quality of assessment to ensure that it encourages the development of the holistic understanding of the subject.

Synopticity requires students to connect knowledge, understanding and skills acquired in different parts of the Advanced GCE course.

Synoptic assessment in the context of design and technology requires students to apply skills, knowledge and understanding gained at Advanced Subsidiary level to A2 level.

Stretch and challenge

Students can be stretched and challenged in A2 units through the different assessment strategies, for example:

- using a variety of stems in questions — for example analyse, evaluate, discuss, compare
- a requirement for extended writing
- use of a wider range of question types to address different skills — for example open-ended questions etc
- justifying, evaluating and carrying out life cycle assessment in the internal assessment
- improvement of synoptic assessment.

Additional information

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the latest *Joint Council for Qualifications (JCQ) Instructions for Conducting Coursework* document. This document is available on the JCQ website: www.jcq.org.uk.

For additional information on malpractice, please refer to the latest *Joint Council for Qualifications (JCQ) Suspected Malpractice in Examinations And Assessments: Policies and Procedures* document, available on the JCQ website.

Access arrangements and special requirements

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, and Entry Level is designed to ensure equal access to qualifications for all students (in compliance with the Equality Act 2010) without compromising the assessment of skills, knowledge, understanding or competence.

Please see the Joint Council for Qualifications (JCQ) website (www.jcq.org.uk) for their policy on access arrangements, reasonable adjustments and special considerations.

Please see our website (www.edexcel.com) for:

- the forms to submit for requests for access arrangements and special considerations
- dates to submit the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements
Edexcel
One90 High Holborn
London WC1V 7BH

Equality Act 2010

Please see our website (www.edexcel.com) for information on the Equality Act 2010.

Prior learning and progression

Prior learning

Students who would benefit most from studying a GCE in Design and Technology are likely to have one of the following:

- a Level 2 qualification such as a GCSE in Design and Technology at grades A*-C
- a Level 2 qualification such as GCSE (Double Award) in Manufacturing.

Progression

This qualification supports progression into:

- further education in courses such as food marketing management, food and nutrition, nutrition, health and lifestyles, public health nutrition
- training or employment.

Combinations of entry

The Advanced Subsidiary in Design and Technology: Food Technology is the foundation for the Advanced GCE in Design and Technology: Food Technology. It is therefore forbidden for students to:

- study one focus area at Advanced Subsidiary and a different focus area for the Advanced GCE award
- mix different focus areas within the AS and A2 units.

Students may, however, study one focus area for the Advanced Subsidiary award and a different focus area for another Advanced Subsidiary award.

Student recruitment

Edexcel's access policy concerning recruitment to our qualifications is that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

The wider curriculum

This qualification provides opportunities for developing an understanding of moral, ethical, social and cultural issues, together with an awareness of environmental issues, health and safety considerations, and European developments consistent with relevant international agreements appropriate as applied to design and technology. *Appendix 3: Wider curriculum* maps the opportunities available.

Edexcel publications

You can order further copies of the specification and sample assessment materials (SAMs) documents from:

Edexcel Publications
Adamsway
Mansfield
Notts NG18 4FN

Telephone: 01623 467467
Fax: 01623 450481
Email: publication.orders@edexcel.com
Website: www.edexcel.com

Additional resources endorsed by Edexcel

Edexcel also endorses additional materials written to support this qualification.

Any resources bearing the 'Endorsed by Edexcel' logo have been through a rigorous quality assurance process to ensure complete and accurate support for the specification. For up-to-date information about endorsed resources, please visit www.edexcel.com/endorsed.

Please note that while resources are checked at the time of publication, materials may be withdrawn from circulation and website locations may change.

The resources listed are intended to be a guide for teachers and not a comprehensive list. Further suggestions can be found in *Appendix 2: Further resources and support*.

Please see www.edexcel.com/gce2008 for up-to-date information.

Edexcel support services

Edexcel support services

Edexcel has a wide range of support services to help you implement this qualification successfully.

ResultsPlus – ResultsPlus is an application launched by Edexcel to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in 'one-click'. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit www.edexcel.com/resultsplus

Ask the Expert – to make it easier for our teachers to ask us subject specific questions we have provided the **Ask the Expert** Service. This easy-to-use web query form will allow you to ask any question about the delivery or teaching of Edexcel qualifications. You'll get a personal response, from one of our administrative or teaching experts, sent to the email address you provide. You can access this service at www.edexcel.com/ask

Support for Students

Learning flourishes when students take an active interest in their education; when they have all the information they need to make the right decisions about their futures. With the help of feedback from students and their teachers, we've developed a website for students that will help them:

- understand subject specifications
- access past papers and mark schemes
- learn about other students' experiences at university, on their travels and when entering the workplace.

We're committed to regularly updating and improving our online services for students. The most valuable service we can provide is helping schools and colleges unlock the potential of their learners. www.edexcel.com/students

Training

A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Edexcel each year on a regional basis. Full details can be obtained from:

Training from Edexcel
Edexcel
One90 High Holborn
London WC1V 7BH

Email: trainingbookings@pearson.com
Website: www.edexcel.com/training

F Appendices

Appendix 1 Performance descriptions 87

Appendix 2 Further resources and support 93

Appendix 3 Wider curriculum 97

Appendix 4 Codes 99

Introduction

Performance descriptions have been created for all GCE subjects. They describe the learning outcomes and levels of attainment likely to be demonstrated by a representative candidate performing at the A/B and E/U boundaries for AS and A2.

In practice most candidates will show uneven profiles across the attainments listed, with strengths in some areas compensating in the award process for weaknesses or omissions elsewhere. Performance descriptions illustrate expectations at the A/B and E/U boundaries of the AS and A2 as a whole; they have not been written at unit level.

Grade A/B and E/U boundaries should be set using professional judgement. The judgement should reflect the quality of candidates' work, informed by the available technical and statistical evidence. Performance descriptions are designed to assist examiners in exercising their professional judgement. They should be interpreted and applied in the context of individual specifications and their associated units. However, performance descriptions are not designed to define the content of specifications and units.

The requirement for all AS and A level specifications to assess candidates' quality of written communication will be met through one or more of the assessment objectives.

The performance descriptions have been produced by the regulatory authorities in collaboration with the awarding bodies.

AS performance descriptions for Design and Technology

Assessment objectives	Assessment objective 1	Assessment objective 2
A/B boundary performance descriptions	<p>Candidates 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.</p> <p>Candidates characteristically:</p> <ol style="list-style-type: none"> demonstrate specific knowledge and understanding of the working characteristics of materials, ingredients, components and their uses and/or systems and control <ul style="list-style-type: none"> develop an appropriate brief and specification understand quality issues use correct technical language relevant to the task research and communicate a broad range of ideas and information effectively in a creative and innovative way through some recognition of values issues or uniqueness (for the candidate) or connections with other ideas <ul style="list-style-type: none"> demonstrate that they understand the main features of industrial and commercial practices related to manufacturing systems including the use of ICT and stages of production show that they understand health and safety issues through the regulatory and legislative framework demonstrate clear strategies for testing and evaluating by taking into account form and function of a product, trends and styles of products reflecting environmental, cultural and ethical/ moral issues as well as stylistic and engineering considerations <ul style="list-style-type: none"> analyse and assess information and ideas in appropriate ways, including ICT, enabling others to interpret them. 	<p>Candidates 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.</p> <p>Candidates characteristically:</p> <ol style="list-style-type: none"> apply skills that demonstrate understanding of the working characteristics and potential application of a range of materials, ingredients, components and/or systems and control including preparation and processing <ul style="list-style-type: none"> demonstrate that they understand the principles of testing materials and/or components demonstrate that they understand and can carry out appropriate making processes during product development/manufacture <ul style="list-style-type: none"> understand and use safe working practices use appropriate skills in the development of a practical outcome communicate ideas and outcomes <ul style="list-style-type: none"> refine and/or modify products and/or manufacturing methods use a range of criteria, for example social, economic, environmental, cultural, and ethical/ moral considerations demonstrate clear strategies for testing and evaluating by analysing the planning, production and manufacturing methods.

E/U boundary performance descriptions	Assessment objective 1	Assessment objective 2
	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> a demonstrate some understanding of how their knowledge and understanding of materials, ingredients, components and their uses meet general design criteria <ul style="list-style-type: none"> ■ develop an outline brief and specification b communicate ideas and information appropriately <ul style="list-style-type: none"> ■ demonstrate that they understand at least one feature of industrial and commercial practices, a relevant manufacturing system and some stages of production c demonstrate some strategies for testing and evaluating by taking into account form and function of a product and the need for appropriate modifications. 	<p>Candidates characteristically:</p> <ul style="list-style-type: none"> a demonstrate that they understand the application of a limited range of materials, ingredients and components including their uses <ul style="list-style-type: none"> ■ demonstrate some knowledge of testing a material or component b demonstrate that they understand and can carry out a limited range of making processes safely during product development <ul style="list-style-type: none"> ■ demonstrate that they understand how to plan for production c communicate ideas and outcomes through a suitable development process and manufacturing method d demonstrate the ability to test and evaluate a limited range of manufacturing methods.

A2 performance descriptions for Design and Technology

Assessment objectives	Assessment objective 1	Assessment objective 2
A/B boundary performance descriptions	<p>Candidates 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.</p> <p>Candidates characteristically:</p> <ol style="list-style-type: none"> demonstrate specific ability to analyse questions and/or contexts and select and explain relevant ways to proceed during in-depth study <ul style="list-style-type: none"> take account of a wide range of factors and show knowledge and understanding of materials and manufacturing processes combine distinct elements of technical information in their responses develop an initial design brief, an outline specification and produce a design for manufacturing, considering maintenance and product life clarify the task during designing and making activities identifying a wide range of user needs and carry out in-depth research including some relevant primary research originate a range of ideas and possible solutions when generating and developing proposals <ul style="list-style-type: none"> apply knowledge and understanding to develop and refine their solutions, demonstrating evidence of creativity and innovation through recognition of values issues or uniqueness (for the candidate) or connections with other ideas research, analyse and communicate a broad range of ideas and information effectively <ul style="list-style-type: none"> use technical language fluently and draw appropriate conclusions model aspects of their ideas when developing proposals 	<p>Candidates 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.</p> <p>Candidates characteristically:</p> <ol style="list-style-type: none"> demonstrate their understanding of systems and control and/or products and applications by discriminating between aspects of a system or product that perform and those which could be improved after in-depth study <ul style="list-style-type: none"> demonstrate understanding of reliable and quantifiable performances of a range of materials, components and production processes demonstrate applied knowledge of the working properties and functions of materials and components work safely, accurately and skilfully with materials, components, tools and processes including appropriate technologies to create high-quality products that match the specification plan, demonstrating an awareness of industrial methods and approaches during designing and making activities <ul style="list-style-type: none"> select an appropriate range of tools, equipment and plan processes manage time by anticipating potential problems and responding to changing circumstances determine the degree of accuracy required for products to function as intended, and apply relevant external standards to their task test the performance of their product against specified criteria and act on their findings by modifying their proposals if appropriate

	Assessment objective 1	Assessment objective 2
E/U boundary performance descriptions	<p>Candidates characteristically:</p> <p>a demonstrate their ability to analyse questions and/or contexts and record some relevant information during in-depth study</p> <ul style="list-style-type: none"> ■ take account of a limited range of factors ■ take account of requirements and demonstrate some knowledge and understanding of manufacturing processes during product analysis ■ develop a design brief and specification <p>b use technical language relevant to the task</p> <ul style="list-style-type: none"> ■ clarify the task identifying user needs and carry out research during designing and making activities ■ generate ideas based on their own knowledge and understanding, satisfying most of the specification criteria ■ show awareness of manufacturing processes ■ develop their proposals and model at least one aspect ■ indicate at least one working characteristic of a material or component ■ demonstrate some strategies for testing and evaluating that refer to products and the need for modifications ■ evaluate ideas and outcomes in an appropriate way, including ICT, and draw conclusions enabling others to understand them. 	<p>Candidates characteristically:</p> <p>a demonstrate a basic understanding of systems and control and/or products and applications during in-depth study</p> <p>b demonstrate some understanding of a limited range of materials, ingredients, components and production processes</p> <p>c work safely with materials, ingredients and components to create a product that meets their specification</p> <p>d plan, demonstrating some awareness of industrial methods during making activities</p> <p>e select some appropriate tools and resources</p> <p>f carry out at least one test of their product</p> <p>g work to an outline plan.</p> <p>h use ICT appropriately for communicating, modelling, data handling, controlling or manufacture</p> <p>i demonstrate strategies for testing and evaluating:</p> <ul style="list-style-type: none"> ■ analyse information ■ assess the extent to which the product meets its specification.

Please note that while resources are checked at the time of publication, materials may be withdrawn from circulation and website locations may change at any time.

Books

Textbook

Proudlove R K — *The Science and Technology of Foods, Fifth Edition* (Forbes, 2009) ISBN 1899527087

Reference books

Fox B and Cameron A — *Food Science, Nutrition and Health, Seventh Edition* (Hodder Arnold, 2006) ISBN 0340809485

Gamon P M and Sherrington K B — *The Science of Food, Fourth Edition* (Butterworth-Heinemann, 1996) ISBN 075062373X

Garbutt J — *Essentials of Food Microbiology* (Hodder, 1997) ISBN 0340677015

Hallam E — *Understanding Industrial Practices in Food Technology* (Nelson Thornes, 2005) ISBN 0748790209

Howard K and Prisk E — *Science Experiments in Food and Textiles* (Forbes Publications Ltd, 1995) ISBN 0901762970

Useful websites

www.bsigroup.co.uk

The British Standards Institution

Information on CE Marking, Kitemark etc.

www.cat.org.uk

Centre for Alternative Technology (CAT)

Information on globally sustainable, whole and ecologically sound technologies and ways of life.

www.data.org.uk

The Design and Technology Association

List of resources for design and technology.

<http://extra.shu.ac.uk/foodtechnology>

Sheffield Hallam University

Details of food processing, laboratory and simulated industrial equipment.

www.food.gov.uk

Food Standards Agency

Information about public's health and consumer interests in relation to food.

www.hse.gov.uk

Health and Safety Executive

Information on risk assessment.

www.ifst.org

Institute of Food Science and Technology

Information on food, nutrition, food safety and processing.

Special sites on experiments for school teachers, resources for school projects, schools' liaison programmes and careers.

www.nutrition.org.uk

British Nutrition Foundation

Information on diet, physical activity and health.

www.nationalstemcentre.org.uk/tep

Technology Enhancement Programme (TEP)

Programme aimed at supporting and improving the teaching and learning of technology in schools and colleges.

Handbooks

The Sustainability Handbook for D&T Teachers — Produced by Practical Action in collaboration with the centre for Alternative Technology and Loughborough University. Funded by the European Community and the Countryside Council for Wales.

Signposting

Issue	Unit 1	Unit 2	Unit 3	Unit 4
Moral			✓	
Ethical			✓	
Social			✓	
Cultural	✓		✓	✓
Environmental	✓	✓	✓	✓
European initiatives	✓			✓
Health and safety	✓	✓		✓

Development suggestions

Issue	AS/A2 units	Opportunities for development or internal assessment
Moral	3	Unit 3: Impact of moral issues on product design, development and manufacture.
Ethical	3	Unit 3: An awareness of the implications of special diets for ethnic and religious avoidance.
Social	3	Unit 3: The social changes that influence the generation of new product ideas.
Cultural	1, 3, 4	Unit 1: Analysing the needs of different cultures when researching the design specification of a food product. Unit 3: Cultural changes that influence the generation of new product ideas. Unit 4: Understanding the cultural requirements of the client/user-group when communicating design proposals.
Environmental	1, 2, 3, 4	Unit 1: Environmental effects of using the materials and/or components/ingredients in products. Unit 2: Environmental issues when using materials for packaging. Unit 3: An awareness and implications of the sustainability of food supplies. Unit 4: Environmental costs of extracting, producing and processing selected materials and/or components/ingredients.
European initiatives	1, 4	Unit 1: Applying quality standards and regulations to product design. Unit 4: Researching appropriate standards when constructing a design specification.

Issue	AS/A2 units	Opportunities for development or internal assessment
Health and safety	1, 2, 4	<p>Unit 1: Risks involved in using specific equipment throughout making and appropriate precautions to minimise those risks.</p> <p>Unit 2: Principles and application of the Food Safety Act.</p> <p>Unit 4: Risks involved when using equipment and the precautions that should be taken to minimise those risks.</p>

Type of code	Use of code	Code number
National classification codes	Every qualification is assigned to a national classification code indicating the subject area to which it belongs. Centres should be aware that students who enter for more than one GCE qualification with the same classification code will have only one grade (the highest) counted for the purpose of the school and college performance tables.	9020
National Qualifications Framework (NQF) codes	Each qualification title is allocated a National Qualifications Framework (NQF) code. The National Qualifications Framework (NQF) code is known as a Qualification Number (QN). This is the code that features in the DfE Section 96, and on the LARA as being eligible for 16-18 and 19+ funding, and is to be used for all qualification funding purposes. The QN is the number that will appear on the student's final certification documentation.	The QNs for the qualifications in this publication are: AS — 500/2662/8 GCE — 500/2650/1
Unit codes	Each unit is assigned a unit code. This unit code is used as an entry code to indicate that a student wishes to take the assessment for that unit. Centres will need to use the entry codes only when entering students for their examination.	Unit 1 — 6FT01 Unit 2 — 6FT02 Unit 3 — 6FT03 Unit 4 — 6FT04
Cash in codes	The cash-in code is used as an entry code to aggregate the student's unit scores to obtain the overall grade for the qualification. Centres will need to use the entry codes only when entering students for their qualification.	AS — 8FT01 Advanced GCE — 9FT01
Entry codes	The entry codes are used to: 1 enter a student for the assessment of a unit 2 aggregate the student's unit scores to obtain the overall grade for the qualification.	Please refer to the <i>Edexcel Information Manual</i> available on the Edexcel website.

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This specification is Issue 3. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on the Edexcel website: www.edexcel.com

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