



# Examiners' Report/ Lead Examiner Feedback

June 2015

NQF BTEC Level 1/Level 2 Firsts in  
Construction

Unit 11: Sustainability in Construction  
(21635E)

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## Grade Boundaries

### External assessment

The suite of 'next generation' NQF BTECs include an element of external assessment. This external assessment may be through a timetabled paper-based examination, an onscreen, on demand test or a set-task conducted under controlled conditions.

### What is a grade boundary?

A grade boundary is where we 'set' the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade (Distinction, Merit, Pass and Level 1 fallback).

### Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries - this means that they decide what the lowest possible mark should be for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries ensures that a learner who receives a Distinction grade next year, will have similar ability to a learner who has received an Distinction grade this year. Awarding grade boundaries is conducted to make sure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

### Variations in externally assessed question papers

Each exam we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries year on year because then it wouldn't take into account that a paper may be slightly easier or more difficult than the year before.

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

Grade	Unclassified	Level 1 Pass	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Boundary Mark	0	10	20	30	40

## **Introduction**

This report has been written by the Lead Examiner for BTEC Construction and the Built Environment Unit 11 – Sustainability in Construction. It is designed to help you understand how learners performed overall in the exam. For each question there is a brief analysis of learner responses. You will also find some examples of learner responses at a range of different marks. We hope you will find this will help you to prepare your learners for future examination series.

## **General Comments on Exam**

This was the third examination for this unit, and overall the paper produced a reasonable range of responses.

It is noticeable that a number of learners did not attempt a number of the questions; however, learners did appear to manage their time effectively and appeared to be able to complete the paper in the allotted time. There did not appear to be evidence of rushed work towards the end of the paper. Therefore, where questions were not answered this may have been due to learners not having the knowledge to provide a response.

The more demanding questions require learners to apply their knowledge in response to sustainability issues related to a range of construction scenarios. It was evident from the responses to some questions that learners had limited knowledge of sustainability in relation to construction. Learners may have some prior learning in respect of environmental and sustainability issues, but it is important that learners are taught sustainability in the context of construction covering the lifecycle of a development and the full range of topics covered in the unit specification. For example, learners appeared to have little knowledge and understanding of biomass boilers or air source heat recovery.

Learners would also benefit from being taught examination skills and techniques as often they did not appear to have read the question properly. This resulted in questions not being answered using an appropriate methodology. Where questions required learners to 'identify' many provided extended responses where only naming is required. Learners should be familiar with the command verbs to be able to effectively answer questions that require them to 'describe', 'explain', 'discuss' and 'compare'. Learners need to provide a response that answers the question and not just repeat information from either the question or the scenario in Section B. Many responses to Question 20 were largely a list of the information provided in the scenario. Learners did not go on to compare the sustainability of the two buildings and demonstrate their knowledge of sustainability.

## Section A

### Question 1

This question required the identification of two sources of waste produced during the operation of a building.

**Targeted Specification Area: Learning Aim A2.3**

**Q1:** Many learners were able to identify 'energy' and leakage of water'.

### Question 2

This question required identifying aspects of the environment that may be damaged through the use of land for construction purposes.

**Targeted Specification Area: Learning Aim A2.1**

**Q2:** Many learners were able to identify aspects of the environment. A range of responses were given and included 'wildlife', 'soil contamination', 'loss of green space', 'trees and forests' and 'pollution'.

### Question 3

This question required the identification of ways to reduce exhaust emissions from construction traffic, plant and machinery.

**Targeted Specification Area: Learning Aim A2.4**

**Q3:** Most learners were able to identify at least one way and many identified two ways. A wide range of responses were given and covered the range of correct responses included in the mark scheme. Common responses were 'regular maintenance or servicing', 'locally sourced materials', 'buying in bulk' and 'switch off when not in use'.

#### Question 4

This question required the identification of one reason why waste skips are covered during transportation.

**Targeted Specification Area: Learning Aim A2.3**

**Q4:** A large number of correct responses were given. The most frequent response was 'stop waste falling out'.

1 mark example:

**4** Waste materials from construction operations need to be transported off site safely.

Identify **one** reason for covering full waste disposal skips during transportation.

Because if the skip is covered then no waste can fall out of the skip

#### Question 5

This question required learners to identify ways to reduce high carbon emissions created during the manufacture of high energy materials.

**Targeted Specification Area: Learning Aim A2.4**

**Q5:** Few learners provided correct responses to this question. From the responses given it appeared that learners did not understand that the question is about the manufacture of high energy materials that require a high energy input. The correct responses are 'the use of green energy in manufacture', 'use of efficient plant / equipment / maintaining equipment' or 'changing to more efficient manufacturing processes / methods'. Incorrect responses made reference to recycling or manufacturing in small quantities.

2 mark example:

**5** Identify **two** ways to reduce high carbon emissions created during the manufacture of high energy materials.

1 use renewable sources of energy

2 cut down on waste

## Question 6

This question required the identification of site practices that can be used to minimise the effect of a construction project on the local community.

**Targeted Specification Area: Learning Aim 3.2**

**Q6:** Many learners were able to identify at least one of the two site practices 'maintaining a clean and tidy site' and 'providing on-site parking facilities'.

## Question 7

This question required the explanation of how a form of site security could reduce the impact of a construction project on the local community.

**Targeted Specification Area: Learning Aim A3.2**

**Q7:** A number of learners were able to identify a form of site security and provide a linked response to explain how this will reduce the impact of a construction project on the local community. The most frequently identified form of security was 'site fencing' with a linked response 'will prevent unauthorised access'. Some learners could not be awarded full marks as they failed to identify a form of site security, but provided the linked response as to how this would reduce the impact on the local community.

2 mark example:

**7** Explain how **one** form of site security could reduce the impact of a construction project on the local community.

A secure perimeter fence and gate system would reduce the impact of a construction project as parents would not need to worry about their children entering the site and potential been injured.

### Question 8

This question required learners to identify a reason that a developer requires a financial return.

**Targeted Specification Area: Learning Aim A4**

**Q8:** Many learners were able to identify a reason. The most common correct responses were 'make money', 'make a profit' and 'fund future developments'.

1 mark example:

**8** Identify **one** reason why a developer needs a financial return on a development.

To make money

### Question 9

This question required the identification of two costs that need to be considered in the life cycle costing of a building.

**Targeted Specification Area: Learning Aim A4**

**Q9:** Many learners were able to identify at least one cost that needs to be considered in life cycle costing. All responses from the mark scheme were given. Common responses were, 'build costs', 'service costs', 'maintenance costs' and 'refurbishment costs'.

2 mark example:

**9** Identify **two** costs that need to be considered in the life cycle costing of a building.

1 Energy consumption

2 maintenance costs



## Question 10

This question assessed the learners understanding of biomass boilers.

### Targeted Specification Area: Learning Aim B.3

**Q10(a):** The majority of learners were able to identify why biomass boilers contribute towards sustainability. Typical response was the 'use of sustainable/renewable fuels'.

1 mark example:

**10** A school is considering replacing its current oil-fired boilers with biomass boilers.

(a) Identify **one** reason why biomass boilers contribute towards sustainable development.

(1)

Because they use renewable energy.

**Q10(b):** Few learners were able to provide a correct explanation of two disadvantages of biomass boilers. Many responses were very generic such as 'heavy' or 'expensive'. Learners showed a poor understanding of biomass boilers. The unit specification Topic B.3 Alternative energy sources requires learners to 'Understand the characteristics, applications and advantages/disadvantages of using the following renewable sources of energy'. Correct responses included comparing the purchase and installation cost against other forms of boiler, the need to store fuel on site and the need for regular maintenance/emptying the ash bin.

4 mark example:

(b) Explain **two** disadvantages of biomass boilers.

(4)4

1 They are costly to install and need a constant source of wood chips. also need more storage space for fuel.

2 They also take up more space than a standard oil fired boiler. has more maintenance than a oil boiler.

### Question 11

This question required the identification of government regulations and voluntary codes relating to comfort, health and conservation of fuel and power.

**Targeted Specification Area: Learning Aim B.1**

**Q11:** The required response is direct recall from the unit specification B.1. Few learners provided a correct response. Those that did identified the 'building regulations'. The Health & Safety at Work Act 1974 was also accepted as a correct response.

### Question 12

This question required the identification of how thermal mass within buildings can reduce energy requirements.

**Targeted Specification Area: Learning Aim B1**

**Q12:** Few learners appeared to understand the concept of using the mass of a building to store heat for later use or to absorb heat to assist with cooling and reduce internal temperature gain. Learners having not understood the concept concentrated their responses on insulation and how this reduces heat loss from buildings.

1 mark example:

**12** Identify **one** way thermal mass within buildings can reduce energy requirements.

because thermal mass can absorb  
some thermal energy lowering need to add m

### Question 13

This question required the identification of a sustainable natural roofing material apart from thatch.

**Targeted Specification Area: Learning Aim B2**

**Q13:** The majority of learners were able to provide a response to this question. Common correct responses included 'slate' and 'timber'. Green roof on its own was not accepted as this is a form of construction and not a material. Marks were awarded where a green roof material was given e.g. sedum or soil. Some learners gave the response 'straw', but this is a form of thatch and so could not be awarded any marks.

## Question 14

This question required the identification of a reason why specifying modular dimensions in the design of buildings reduces waste.

**Targeted Specification Area: Learning Aim B.2**

**Q14:** Many learners were able to identify a way. The frequent responses were 'less cutting on site' and 'estimator can more accurately calculate the amount of material required'.

## Question 15

This question assessed the learners' understanding of the disposal of waste and the advantages of using incineration.

**Targeted Specification Area: Learning Aim A2.3**

**Q15:** Many learners were able to identify at least one advantage with some going on to provide two explanations of advantages. Correct responses included 'the reduction of landfill requirements as the volume of material is greatly reduced' and 'potential for generating electricity as a result of the heat produced during the incineration processes. Many learners showed little understanding of incineration to dispose of waste. They showed little awareness that incineration is through the use of purpose built plant and not via an open fire. Some learners provided responses such as quick and cheap. This form of response must be quantified and compared against an alternative form of disposal to make it a valid response, and it will only be awarded marks if correct.

4 mark example:

**15** Explain **two** advantages of disposing of waste material by incineration.

1 Mass amounts of material can be disposed through incineration. Doing so will save land from becoming landfills, maintaining greenfield sites.

2 Multiple types of waste can be disposed of at the same time, with out the need of separation. This maintains the disposal plants efficiency.

## SECTION B

### Question 16

This question was scenario-based and required site practices that will minimise the effect of the construction work on traffic in front of Building 1.

**Targeted Specification Area: Learning Aim B5**

**Q16:** The majority of learners were able to identify one or both of 'road sweeping' and 'wheel cleaning'.

### Question 17

This question was scenario-based and required learners to explain a way the green space in front of Building 2 can benefit its residents.

**Targeted Specification Area: Learning Aim B1**

**Q17:** Many learners were able to both identify a way and provide the linked response as to how this benefitted the residents. Common responses were 'provided somewhere for children to play that is safe' and 'provides a social area where residents can meet up and socialise together'.

2 mark example:

**17** Explain **one** way the green space in front of Building 2 can benefit its residents.

it gives young children a place to exercise  
or play safely.

## Question 18

This question was scenario-based and required learners to show an understanding of air source heat recovery to provide space heating for Building 1.

### Targeted Specification Area: Learning Aim B3

**Q18:** Few learners were able to provide a correct explanation of two advantages of air source heat recovery for space heating. The unit specification Topic B.3 Alternative energy sources highlights the requirement for learners to 'Understand the characteristics, applications and advantages/disadvantages of using the following renewable sources of energy'. From the responses provided it appears that many learners have either misunderstood the question or confused air source heat recovery with heat recovery from ventilation extract systems; there is no mention in the scenario of Building 1 having such a system. The mark scheme provides a range of possible correct responses and correct responses from learners included 'cost effective as it uses less energy than other forms of heating' and 'can provide cooling when it's hot'. Some learners identified an advantage without providing a linked response and so were not able to be awarded full marks.

4 mark example:

**18** Air source heat recovery is being used to provide space heating to Building 1.

Explain **two** advantages of using an air source heat recovery system.

1. an air source heat recovery system is (sustainable)  
: and can be used all year round  
because it can be used for  
hot air and cold air

2. It saves energy costs as the air will  
give you heat instead of a electric or gas  
gas. This makes the carbon footprint lower  
for the building and saves money.

## Question 19

This question required an understanding of water saving fittings, apart from flow restrictors, to reduce the use of mains water.

### Targeted Specification Area: Learning Aim B1

**Q19:** Few learners were able to describe how two water efficient fittings can reduce the use of mains water. Correct responses provided included, 'low water shower heads that deliver less water through aeration', 'dual flush toilet cisterns that deliver a low volume flush' and 'push auto stop taps that run for fixed time and can't be left running'. A number of learners gave the response of grey water and rainwater harvesting, both of which are not water fittings, but are systems for reducing the use of mains water.

4 mark example:

**19** Flow restrictors can reduce the use of mains water.

Describe how **two** other water efficient fittings can reduce the use of mains water.

1 you can change your shower head so that it add pressure air to your water saving up to 30% <sup>water</sup> per shower.

2 you can have a low dense flush for light <sup>content in toilet</sup> ~~toilet~~s and higher dense flush for higher content in toilet.

## Question 20

This question was scenario-based and required a comparison of the sustainability of Building 1 and Building 2 in their current state.

**Targeted Specification Area: Learning Aim A4 / B1**

**Q20:** The majority of learners provided a response to this question.

Learners were required to compare the sustainability of the two buildings in the scenario. A comparison requires the similarities and differences to be identified and for an explanation on how this contributes to the sustainability of the buildings.

Many learners were able to pick out a number of elements from the scenario. However, fewer learners were able to compare the identified elements and a smaller number of learners were able to effectively relate the comparison to the sustainability of the buildings. For example:

The wall construction of the two buildings; Building 1, timber frame with an outer brick skin, and Building 2, cavity block and brick. The comparison is that they will both provide some insulation against heat loss, but the timber frame of Building 1 is likely to have a greater amount of insulation. The cavity of Building 2 is open with no insulation. The greater the level of insulation provided will result in a lower degree of heat loss, and thus this will reduce the amount of heating required and lead to lower energy bills and reduce the carbon footprint of the building.

The mark scheme provides a range of elements of materials, design and technology solutions, social/community issues and operating and maintenance issues that could be considered in the comparison. The mark scheme also provides three descriptor mark bands by which the responses are assessed and awarded marks. The learner's application of knowledge of sustainability in relation to the scenario is taken into consideration. Some learners concentrated on presenting the information given in the scenario, both from the text and the photographs, but failed to develop their responses to make a comparison and demonstrate knowledge of sustainability.

Lower mark band learners are expected to identify similarities and differences in the form of a list with little or no explanation, and demonstrating a limited knowledge of sustainability.

For the mid mark band learners will provide some further explanation of the elements being compared and provide a basic conclusion as to which building is more sustainable. The response will demonstrate some knowledge of sustainability related to construction.

For the higher mark band detailed explanation of the elements being compared will be provided demonstrating a developed knowledge of sustainability related to construction. A reasoned conclusion will be given.

The descriptors for the mark bands can be found at the end of the mark scheme.

20 Compare the sustainability of Building 1 and Building 2 in their current state.

2 Q20

Building 1's has a better sustainability because it is a much newer building being 54 years better off than building 2 it has lots of modern features such as the building is south facing so attracts natural light and heat it also uses advanced window systems and air source heat recovery system and uses incorporate sustainable technologies, building one however uses single glazed windows which are not very sustainable because they will have to power more heat into the building to keep it warm, the building also uses suspended timber floors with little or no insulation which would make the building really cold and damp in the winter and it uses a gas-fired central heating system which is not sustainable because it will use up a lot of gas during the year. So I conclude that overall building 1 is a lot more sustainable and healthier than building 2.



20 Compare the sustainability of Building 1 and Building 2 in their current state.

5

Building one - has been built on a green field site so has potentially destroyed habitats and ecosystems, if it was built on a brown field site the land would be re used. The building is South facing so gets optimum sun yet no solar panels have been fitted so they have missed an opportunity to get sustainable energy. Yet it is timber framed which is a sustainable material as wood can be regrown. It is going to have advanced window systems so should keep more heat in requiring less energy for heat also being fitted with an air source heat recovery system also helping heat stay in requiring less energy.

On the other hand building 2 faces open green space so animals and habitats are still there. It has cavity block and brick walls meaning there is the chance for insulation but heat will be escaping already meaning over using energy. block and brick work have high embodied energy and the materials used to make them are not sustainable. Cast Iron drain pipe and guttering means Iron is high embodied energy and rain water is not being harvested and re used. New UPVC double glazing means less heat is being lost so less energy will be required to

heat the building. It has a gas-fired central heating and hot water tank, meaning gas is being wasted which isn't sustainable and CO<sub>2</sub> emissions are given off.

No Band 3 Descriptor Examples are available.

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