



Examiners' Report/ Lead Examiner Feedback

January 2017

NQF BTEC Level 1/Level 2 Firsts in
Construction and the Built Environment

Unit 11: Sustainability in Construction
(21635E)

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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.

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 a 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

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 | 9 | 19 | 29 | 39 |

General Comments on Exam

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

It is noticeable that some learners did not attempt all 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 straw bale construction, eco-joists and the application of grey water systems.

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. Some responses to Question 18 identified information provided in the scenario. Learners did not go on to discuss how the features and technologies of Building 1 and Building 2 would affect the ongoing running and maintenance.

Section A

Question 1

A multiple choice question that required the identification of two ways of reducing noise from construction operations.

Targeted Specification Area: Learning Aim A2.4

Q1: Many learners were able to identify both of the correct answers 'use of silencers' and 'maintenance of machinery'.

Question 2

This question required learners to give one way the use of modern fuel efficient vehicles and plant can help sustainability.

Targeted Specification Area: Learning Aim A2.4

Q2: Many learners provided a correct response. Frequent responses were 'reduction in emissions'.

Question 3

A multiple choice question that required the identification of two sustainable site practices.

Targeted Specification Area: Learning Aim B5

Q3: Many learners were able to identify 'correct storage of fuels and chemicals' and 'relocation of animal habitats'.

Question 4

This question assessed learners' understanding of safe disposal of waste materials to reduce environmental pollution.

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| Targeted Specification Area: Learning Aim A2.3/A2.4 |
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Q4(a): Few learners were able to identify ways to reduce land contamination from construction work other than minimising fuel and oil spillages. Correct responses included 'correct waste disposal'. The question stated fuel and oil spillages as one form of land contamination and learners were required to give other ways to reduce land contamination, but many learners gave ways of minimising fuel and oil spillages. Thus no marks could be awarded for these responses.

Q4(b): Many learners were able to give a way of disposing of waste materials other than landfill or recycling. Frequent responses were 'incineration' or 'burning'.

1 mark example:

(b) Waste materials are often sent to landfill or recycling sites.

Give **one** other way of disposing of waste materials.

Another way to dispose waste materials is by incineration.

Q4(c): Many learners were able to give one type of environmental damage that may be caused by the transportation of waste materials to landfill sites. Frequent responses were 'air pollution'.

1 mark example:

(c) Give **one** type of environmental damage that may be caused by the transportation of waste to landfill sites.

The Air pollution from transporting them to a Land-fill site

Question 5

A multiple choice question that required the identification of two ways a contractor can minimise the impact of construction work on the local community.

Targeted Specification Area: Learning Aim 3.2

Q5: Many learners were able to identify 'noise reduction equipment' and 'wheel cleaning facilities'.

Question 6

This question required learners to have an understanding of timber based products.

Targeted Specification Area: Learning Aim B2

Q6(a): The majority of learners were able to name a timber based product other than structural insulated panels (SIPs). Frequent responses were 'timber framing' and 'joinery products' such as window frames and doors.

Q6(b): Learners were required to give two advantages of structural insulated panels (SIPs) other than they are a timber product, and timber is a sustainable material. Learners did not appear to have an understanding of SIPs and were thus unable to provide an advantage. The mark scheme provides a number of advantages that learners could have provided.

2 mark example:

(b) Give **two** other advantages of structural insulated panels (SIPs).

- 1 They have been pre insulated which will reduce time on construction.
- 2 They are prefabricated so there is less waste on site.

Question 7

This question required learners to explain one way a building can be designed to minimise damage from flooding.

Targeted Specification Area: Learning Aim B1

Q7: Many learners were able to identify one way a building can be designed, for example 'with a raised floor'. However, not all learners were able to provide a linked response with the purpose of the raised floor 'so it is above the predicted flood level'. Thus not all learners were able to access all marks available for this question.

2 mark example

7 Explain **one** way a building can be designed to minimise damage from flooding.

Building a house in a flood risk area may require you to build a house off ground level this may provide longer protection if a flood was to occur as the water would need to get to a certain level first before damage occurs

(Total for Question 7 = 2 marks)

Question 8

This question required learners to name one insulation product made from recycled materials.

Targeted Specification Area: Learning Aim B2

Q8: Few learners were able to provide a correct response to this question. A large number of learners provided responses of products made from natural materials, for example 'sheep's wool'. Frequent correct responses were 'recycled glass mineral wool' and 'cellulose insulation'.

Question 9

This question required learners to give one example of community liaison other than council workers or developers speaking to local people.

Targeted Specification Area: Learning Aim A3.2

Q9: Many learners were able to give another example of community liaison. A range of responses were given that included 'leaflets', 'surveys' and 'meetings'.

Question 10

This question required learners to state two ways low embodied energy construction materials help sustainability.

Targeted Specification Area: Learning Aim B1

Q10: The majority of learners were able to provide at least one way low embodied energy construction materials help sustainability. Frequent responses were 'reduces use of finite fuels' and 'reduces air pollution from burning fuels'.

2 mark example:

10 State **two** ways low embodied energy construction materials help sustainability.

- 1 They use less energy to make so have less ^{fossil} fuels which helps the environment
- 2 It is use of materials that already are naturally created so has less impact on environment

Question 11

This question assessed the learners' understanding of constructing with straw bales.

Targeted Specification Area: Learning Aim B4

Q11(a): Few learners were able to provide the correct response of 'walls' as the element of a building that straw bales are used to construct. Many learners incorrectly referred to thatched roofs.

1 mark example:

11 Straw bales are produced by the farming industry and are used in sustainable construction.

(a) Name the element of a building that straw bales are used to construct.

Straw bales can be used to construct
walls.

Q11(b): Learners demonstrated a poor understanding of building with straw bales and thus, all but a very few learners, were unable to name a technique for building using straw bales. Correct responses as detailed in the mark scheme are 'lapping the bales', 'a method of pegging/connecting the bales/staking' and 'infill panels (stacking)'.

1 mark example:

(b) Name **one** technique of building using straw bales.

~~To stack them~~ To lay them in rows
and stacking them on top of each other

Q11(c): Learners were required to explain two reasons why straw bales are a sustainable construction material. This requires two two-part responses of an identification of a reason followed by linked responses as to why this makes straw bales sustainable. Some learners were able to identify a reason, but were unable to give a linked response to access all the marks available. Frequent identification was 'natural product' and a linked response would have been 'low embodied energy material or has not used finite resources to produce'.

4 mark example:

(c) Explain **two** reasons why straw bales are a sustainable construction material.

1 They do not require any fore materials which allows it to be produced over again as well as having a positive effect on the environment.

2 They can be transported locally keeping the overall cost down as well as improving Air Pollution.

Question 12

This question assessed the learners' understanding of grey water systems.

**Targeted Specification Area: Learning Aim
A2.5/B1/B4**

Q12: This question required learners to demonstrate an understanding of grey water systems in relation to a given situation. Many learners confused grey water systems with rain water harvesting and provided incorrect responses. Some learners provided descriptions of grey water systems, whereas the question required learners to explain two reasons why a grey water system would not meet all the water requirements at the holiday park. Some learners demonstrated a basic understanding of grey water systems and were able to identify that grey water is 'contaminated' and provided a linked response 'drinking water supply would still be required'.

4 mark example:

12 A new holiday park is being developed in an area with a limited supply of mains water. As a result a grey water system is being considered.

Explain **two** reasons why a grey water system would not meet all the water requirements at the holiday park.

1 Grey water is a non drinkable or useable water so it would only be able to be used in the toilets meaning you would still need an efficient supply of drinkable water to the area.

2 ~~It~~ It is not properly filtered or de-contaminated so would not meet the safety standards required for everyday use.

SECTION B

Question 13

This question was scenario-based and required learners to have an understanding of water saving fittings that could be installed in Building 2 of the scenario.

Targeted Specification Area: Learning Aim B1

Q13: Learners showed a poor understanding and many learners were not able to identify a water saving fitting. Correct responses given included 'push type taps' and 'dual flush toilets'.

Question 14

This question was scenario-based and required learners to state features of trussed rafters used in Building 2 other than they are prefabricated.

Targeted Specification Area: Learning Aim B2

Q14: Learners demonstrated a poor understanding and only a few learners were able to state a correct feature of trussed rafters. The mark scheme provides a list of features learners could have provided. The list includes 'lightweight', 'triangulated framework' and 'computer designed'.

2 mark example:

14 Trussed rafters are prefabricated roof components that have been used in Building 2.

State **two** other features of trussed rafters.

1 They are made of timber

2 They have metal joints nailed to them to hold it together

Question 15

This question was scenario-based and required learners to explain how the use of eco-joists provide a sustainable solution in Building 2.

Targeted Specification Area: Learning Aim B2

Q15: Learners demonstrated a poor understanding of the use of eco-joist in relation to Building 2 in the scenario. The ground floor of Building 2 is open-plan, thus the first floor joists are required to span the full width of the building. A suitable response would be 'Eco-joist are capable of spanning the longer distance found in Building 2' with a linked response 'use less raw material than traditional joists'.

2 mark example:

15 Eco-joists are a sustainable building component.

Explain why the use of engineered eco-joists provides a sustainable solution in Building 2.

It means that you are not using a whole lump of timber you are using small joists stuck together which makes the building more sustainable which is what is supposed to be

Question 16

This question was scenario-based and required learners to explain one reason, other than aesthetics, why photovoltaic panels would not be fitted to the roof at the front of the house.

Targeted Specification Area: Learning Aim B3

Q16: This question required a two part response and many learners identified that the front of the house faced 'north'. Some learners were able to access a further mark with a linked response as to why photovoltaic panels are not suited to a north facing roof 'panels need sunlight to produce maximum electricity'.

2 mark example:

16 The owner of Building 2 is thinking about having photovoltaic panels fitted.

Explain **one** reason, other than aesthetics, why the panels would not be fitted to the roof at the front of the house.

because the building is north facing
So if the pannels were at the front
of the house they wouldn't get any
sunlight.

Question 17

This question was scenario-based and required learners to demonstrate an understanding of energy saving solutions that could be put in Building 1 to reduce its carbon footprint. The payback period of the solutions suggested should have a payback period of five years or less.

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| Targeted Specification Area: Learning Aim B1 |
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Q17: This question required two part responses as learners needed to explain the energy saving solutions. Some learners were able to identify suitable energy saving solutions 'cavity wall insulation' or 'loft insulation'. Few learners were able to access all marks available by providing a linked response 'to reduce the heat loss through the walls' or 'to reduce the heat loss through the ceilings'. Other suitable energy saving solutions are given in the mark scheme. Many learners suggested energy saving solutions with a long payback period, for example photovoltaic panels.

4 mark example:

17 Explain **two** energy saving solutions that could be put in Building 1 to reduce its carbon footprint. You should suggest an energy saving solution that has an expected payback period of five years or less.

1 insulation in the walls, floors and roof will stop the loss of heat from the home requiring less energy to heat it.

2 changing the gas fired boiler to a combined heating and power unit which will reduce energy consumption providing less impact on our carbon footprint.

Question 18

This question was scenario-based and required learners to demonstrate an understanding of ongoing running and maintenance costs of Building 1 and Building 2. Learners are required to respond in the form of a discussion.

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| Targeted Specification Area: Learning Aim A4 |
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Most learners who provided a response were able to pick out some of the features from the scenario related to the running and maintenance of the buildings. Often learners concentrated on one particular aspect, for example the double/triple glazing.

Learners must read the question and the scenario materials carefully as some learners strayed from the question. In their responses suggestions were made of improvements that could be made to the buildings. Other learners had not understood the construction of Building 1 or Building 2 as described in the scenario.

The mark scheme provides a range of points for Building 1 and Building 2 that could have been considered in the discussion of the running and maintenance of the buildings.

The mark scheme also provides three descriptor mark bands by which the responses are assessed and awarded marks. The learner's application of understanding of sustainability in relation to the scenario is taken into consideration.

Learners should only use material that can be gained from the scenario and should not make assumptions where the scenario provides no basis for these.

Lower mark band learners are expected to identify a few running and maintenance issues, with superficial/generic explanation, and show basic understanding of sustainability.

For the mid mark band learners will provide some further discussion of the running and maintenance issues relating them to the two buildings in the scenario. The response will show a good understanding of sustainability.

For the higher mark band learners will provide a detailed discussion of the running and maintenance issues relating these to the two buildings in the scenario. The response will show a developed understanding of sustainability.

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

Middle of Band 1 Descriptor Example (2 Marks)

18 Discuss the ongoing running and maintenance costs of Building 1 and Building 2.

Building 1 maintenance cost is gas-fired central heating is outdate and it will need regular maintenance because it old.

Secondly Building 1 cost on maintenance will be on the gutters because it precast concrete is that if it cracks or something breaks it cost to build and replace the concrete gutters.

Lastly Building 1 has interlocking tiles on the roof which has no insulation which means there spending a lot of money on gas to keep the house warm.

Also maintaining cost of interlocking roof is a lot because it out-dated.

However Building 2 maintenance cost is pipes for under floor heating can cost a lot of money because if any pipes fall the under floor heating wouldn't work.

Secondly one maintenance cost is reroedered and paint need maintaining because it can get damaged easlily and will need repainting it the future.

Thridly. The house is north facing which means if they had solar panels it won't be ~~effacted~~ be efficient and it will cost a lot to maintain.

18 Discuss the ongoing running and maintenance costs of Building 1 and Building 2.

(8)

Building 1

Building 1's heating bill will be a lot higher than Building 2's due to its use of interlocking concrete tiles the hot air will escape through the roof, even though the double glazed PVCu windows would help it won't make much of an impact. Building 1's Gas bill will also be quite high due to the fact they have a Gas ^{fixed} ~~heated~~ ^{central} ~~boiler~~ heating unit which was made in 1980 which means it isn't energy efficient and would use more ~~gas~~ ^{Gas} to heat also it would need to be on longer due to it heating waters and also heating the house which means the hot air would escape ~~and would~~ and the boiler would need to be on longer. The radiators were ~~not~~ converted to PVCu which means they won't rot.

Building 2

Building 2's heating bill will be quite low due to the fact it has Insulated Cavity walls and ~~the~~ floors, and also triple glazed windows which means that less heat would escape and less cold air would go in.

Building 2's electricity bill would be considerably less due to the Solar glass and the soon installed Solar panels because the ~~the~~ mains electricity will only be on at night. Also although they have ~~an~~ ~~electric~~ Combined heat and electric unit it wouldn't cost as much to run because of the ~~the~~ efficient ~~insulation~~ insulation and the use of Solar glass & panels. The only time it would mostly be needed is during the winter time.

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