



# Mark Scheme (Results)

January 2021

Pearson BTEC First Award  
In Construction and the Built Environment

(21492E)

Unit 1: Construction Technology

## Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications website at <http://qualifications.pearson.com/en/home.html> for our BTEC qualifications.

Alternatively, you can get in touch with us using the details on our contact us page at <http://qualifications.pearson.com/en/contact-us.html>

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson. Their contact details can be found on this link:

<http://qualifications.pearson.com/en/support/support-for-you/teachers.html>

You can also use our online Ask the Expert service at <https://www.edexcelonline.com>  
You will need an Edexcel Online username and password to access this service.

### **Pearson: helping people progress, everywhere**

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your learners at: [www.pearson.com/uk](http://www.pearson.com/uk)

January 2021

Publications Code 21492E\_2101\_MS

All the material in this publication is copyright

© Pearson Education Ltd 2021

## General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark grids should be applied positively. Learners must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the mark grid, not according to their perception of where the grade boundaries may lie.
- All marks on the mark grid should be used appropriately.
- All the marks on the mark grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the mark grid.
- Where judgement is required, a mark grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the mark grid to a learner's response, a senior examiner should be consulted.

## Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

Rows in the grids identify the assessment focus/outcome being targeted. When using a mark grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

Question Number	Answer	Mark
1(a)	1 mark for <b>each</b> of: Sheep's wool – Thermal insulation Wall ties – Stability	(2)

Question Number	Answer	Mark
1(b)	1 mark for <b>each</b> : <b>A</b> – Timber <b>D</b> – Straw	(2)

Question Number	Answer	Mark
1(c)	1 mark for <b>each</b> of: <ul style="list-style-type: none"> <li>• Cavity</li> <li>• Wall</li> <li>• Roof/loft/ceiling/attic</li> <li>• Floor</li> <li>• Door</li> <li>• Draught strips</li> <li>• Window/double/triple glazing</li> <li>• Hot water storage</li> <li>• Hot water pipework</li> </ul> <p><b>Up to a maximum of two marks.</b></p>	(2)

Question Number	Answer	Mark
1(d)	1 mark for <b>each</b> : <b>A</b> – To provide thermal comfort <b>E</b> – To prevent dampness	(2)

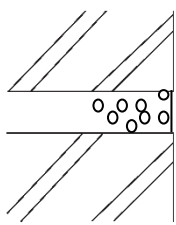
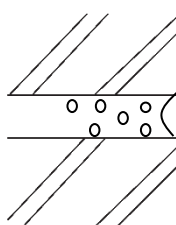
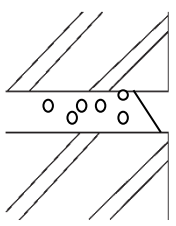
Question Number	Answer	Mark
2	1 mark for <b>each</b> of: <ul style="list-style-type: none"> <li>• Demolition of buildings</li> <li>• Removal of vegetation</li> <li>• Removal of trees</li> <li>• Recycling of materials</li> <li>• Removal of specialist materials e.g. asbestos</li> <li>• Removal of general rubbish</li> </ul> <p><b>Up to a maximum of two marks.</b></p>	(2)

Question Number	Answer	Mark
3	<p>1 mark for <b>each</b> of:</p> <ul style="list-style-type: none"> <li>• Screeded</li> <li>• Chipboard</li> <li>• (tongue-grooved) softwood floorboards</li> <li>• Hardwood</li> <li>• Softwood</li> <li>• Skirtings</li> <li>• Carpets</li> <li>• Tiles/quarry tiles/ceramic tiles/porcelain tiles</li> <li>• Lino/linoleum/vinyl/laminate</li> <li>• Concrete</li> <li>• Stone</li> <li>• Marble</li> <li>• Terrazzo</li> <li>• Granite</li> <li>• Cork</li> <li>• Slate</li> <li>• Parquet blocks</li> <li>• Paint</li> <li>• Varnish</li> </ul> <p><b>Accept any other appropriate answers. Up to a maximum of two marks.</b></p>	(2)

Question Number	Answer	Mark
4	<p><b>A</b> – Recycling</p> <p><b>B</b> – Use of local suppliers</p>	(2)

Question Number	Answer	Mark
5(a)	<p>1 mark for <b>any</b> of:</p> <ul style="list-style-type: none"> <li>• Common</li> <li>• Jack</li> <li>• Cripple jack</li> <li>• Valley</li> <li>• Hip</li> <li>• Truss (rafter)</li> </ul> <p><b>Up to a maximum of one mark.</b></p>	(1)

Question Number	Answer	Mark
5(b)	<p>1 mark for <b>each</b>:</p> <p>(i) Insulation/ Fibre glass/glasswool/sheep's wool                      (ii) Tile/ Concrete                      (iii) Gutter/ Plastic/uPVC                      (iv) Fascia/ Timber/plywood                      (v) Rafter/ Timber</p> <p><b>Up to a maximum of 5 marks.</b></p>	(5)

Question Number	Answer	Mark
6	<p>1 mark for <b>each</b> correct pointing/joint.</p> <p>(i)</p>  <p>(ii)</p>  <p>(iii)</p>  <p><b>Up to a maximum of 3 marks.</b></p>	(3)

Question Number	Answer	Mark
7	<p>2 marks for <b>any</b> of the following explanation of a reason why engineered joists are used compared to solid timber joists.                      1 mark for a reason identified and 1 mark for a linked explanation, up to 2 marks per explanation.                      Up to a maximum of <b>4 marks.</b></p> <p>Any <b>two</b> from the following explanations of the reasons of using engineered joists instead of solid timber joists:</p> <ul style="list-style-type: none"> <li>• reduce wastage on site (1) because joists are made to measure (1)</li> </ul>	(4)

	<ul style="list-style-type: none"> <li>• lower total installation costs (1) because it is easy to handle/quick to install (1)</li> <li>• efficient/sustainable use of material (1) as section is more efficient structurally/lighter (1)</li> <li>• long spans are possible (1) as a result of greater depths of sections possible (1)</li> <li>• they have a good strength to weight ratio (1) allowing for a lightweight floor structure (1)</li> <li>• holes can be easily cut in the web (1) allowing for installation of services (1)</li> </ul> <p><b>Accept any other appropriate answers.</b></p>	
Question Number	Answer	Mark
8	<p>2 marks for any of the following explanation of a reason why the architect would need to take into consideration the loading applied to the building.</p> <p>1 mark for a reason identified and 1 mark for a linked explanation, up to 2 marks per explanation. Up to a maximum of <b>4 marks</b>.</p> <ul style="list-style-type: none"> <li>• To design the building safely (1) to ensure the building does not collapse (1)</li> <li>• The specification/use of suitable materials (1) incorporating economic/correct section sizes (1)</li> <li>• Consider the loading placed on the foundation of the building (1) more extensive foundations may be required (1)</li> <li>• Different factors of safety/weightings are applied to each type of load (1) meaning the structure could be overdesigned if only one type of load was considered (1)</li> <li>• To comply with building regulation requirements (1) to ensure building permission is approved (1)</li> </ul> <p><b>Accept any other appropriate answers.</b></p>	(4)

Question Number	Answer	Mark
9(a)	<p>Perimeter = <math>15 + 5 + 5 + 7 + 10 + 12</math> (M1) = 54 m (A1)</p> <p>2 marks awarded for the correct answer.</p>	
(b)	<p>Method 1: <math>15 \times 12 - 5 \times 7</math> (M1) <math>180 - 35</math> (M2)</p> <p>Method 2: <math>15 \times 5 + 7 \times 10</math> (M1) <math>75 + 70</math> (M2)</p> <p>Method 3: <math>5 \times 5 + 10 \times 12</math> (M1) <math>25 + 120</math> (M2)</p> <p>2 marks awarded for any correct method used above.</p>	(4)

Question Number	Answer	Mark
10	<p>1 mark for an explanation identified, and 1 mark for a linked explanation, up to 2 marks for an explanation. <b>Up to a maximum of 4 marks.</b></p> <p>Any <b>two</b> from the following explanations of why a damp-proof membrane is used in the construction of buildings:</p> <ul style="list-style-type: none"> <li>• Prevent moisture from passing through the raft foundation into the building (1) as the membrane is an impermeable barrier (1)</li> <li>• DPM is waterproof (1) which prevents moisture from passing into insulation materials (1)</li> <li>• DPM allows ease of dealing with waterproofing/detailing (1) allowing for seams and laps (1)</li> <li>• Can be linked to vertical DPM to raft edge (1) links the DPC/cavity gutters at foot of external wall (1)</li> </ul> <p><b>Accept any other appropriate answers.</b></p>	(4)

Question Number	Answer	Mark
11	<p>Award <b>one</b> mark for identification of an advantage or disadvantage and <b>one</b> mark for extension/justification <b>up to two</b> marks each. Candidates may provide 1 advantage + 2 disadvantages OR 2 advantages + 1 disadvantage for full marks. For six marks, the answer must address both advantages and disadvantages.</p> <p><b>Structural insulated panels (SIPs)</b> Advantages</p> <ul style="list-style-type: none"> <li>• Faster speed of construction (1) reduces site labour needed for installation, therefore can result in cost savings (1)</li> <li>• High strength to weight ratio (1) so shallower foundations/less materials required and to be disposed (1)</li> <li>• Lighter frame form (1) thus less concrete needed for foundations (1)</li> <li>• Pre-insulated (1) no need to install installation (1)</li> <li>• May have a variety of finishes(1) contemporary or to blend in with the surroundings (1)</li> <li>• Less construction waste on site (1) as prefabricated (1)</li> </ul> <p>Disadvantages</p> <ul style="list-style-type: none"> <li>• Less public confidence in this wall type as relatively new design (1) may struggle to sell properties/the developer may receive a slow return on the investment made (1)</li> <li>• May have increased maintenance issues (1) due to damage by moisture/ pest infestation (1)</li> <li>• Many builders have less experience constructing this type of wall (1) may have to hire specialist erection teams, increasing set up costs (1)</li> <li>• Modifications to panels are difficult once delivered to site (1) can be expensive and cause construction delays (1)</li> <li>• Less fire resistant (1) may be a negative issue with homeowners (1)</li> </ul>	(6)



	<ul style="list-style-type: none"> <li>• Heavy (1) may require specialist lifting equipment/cranes to place/further increase set up costs (1)</li> </ul> <p><b>Accept any other appropriate answers.</b></p>	
--	--	--

Question Number	Answer	Mark
12	<p>The learner response should include the factors that may influence the developer's decision to develop a new housing development on a greenfield site located on the edge of a city. The learner could discuss costing and environmental consideration. The learner discussion may include some of the points listed below and they may include an overall conclusion.</p> <p>Points for expansion:</p> <ul style="list-style-type: none"> <li>• Number of houses which can be built is estimated at 8</li> <li>• Total profit estimated at <math>8 \times \text{£}35,000 = \text{£}280,000</math></li> <li>• Provides maximum design flexibility to meet project requirements, actual profit projections could be higher if bespoke designs incorporated into the development.</li> <li>• There will be fewer constraints/existing infrastructure</li> <li>• The chosen design may be more able to meet current and future needs as there are fewer constraints from existing infrastructure or buildings</li> <li>• Additional construction/substructure costs are likely to be lower as ground conditions are more likely to be consistent as opposed to on a brownfield site where obstructions, basements/pollutants or the diversion of services may incur costs</li> <li>• However, it may be required to install infrastructure such as roads and services to the site which could incur costs</li> <li>• Allows for the development of space for people to meet/recreational areas (small parks)</li> <li>• No demolition/removal work is required as the site is free of redundant buildings and infrastructure</li> <li>• Can cause disruption to the natural environment e.g. animal habitat, loss of green space, tree preservation orders</li> <li>• May be legal issues with public footpaths/rights of way, which may need diverting or could hold up planning approval</li> <li>• Building on a greenfield may cause objections from the local public which again could cause delays to planning and construction processes, further delaying a return on the property developer's investment</li> </ul>	(6)

Level	Mark	Descriptor
	0	No material deserving of reward.
1	1–2	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions.</li> <li>• Few of the points made will be relevant to the context in the question.</li> <li>• Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them.</li> </ul>
2	3–4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions.</li> <li>• Some of the points made will be relevant to the context in the question, but the link will not always be clear.</li> <li>• Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way.</li> </ul>
3	5–6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate and detailed knowledge and understanding.</li> <li>• Most of the points made will be relevant to the context in the question, and there will be clear links.</li> <li>• Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way.</li> </ul>

Question Number	Indicative content	Mark
13	<p><b>Concrete beam and block floor</b></p> <p>Advantages</p> <ul style="list-style-type: none"> <li>• Fast and simple installation resulting in reduced costs/time</li> <li>• Requires limited specialist skills to construct allows for speed of construction and lack of reliance on skilled staff required to be available</li> <li>• Fire insulation</li> <li>• Unaffected by damp or rot</li> <li>• Allows longer spans than timber joists to support greater loading</li> <li>• Intermediate working platform as soon as units are in place allowing other trades to commence work</li> <li>• Easier to incorporate under floor heating</li> </ul> <p>Disadvantages</p> <ul style="list-style-type: none"> <li>• The need for accuracy as beams should not be cut on site</li> <li>• May require lifting equipment for beams of certain sizes</li> <li>• Difficult to alter once installed</li> <li>• Increased load on foundations may require increased foundation design</li> <li>• Requires a finish</li> <li>• Concrete is less sustainable than timber</li> </ul> <p><b>Suspended timber floor</b></p> <p>Advantages</p> <ul style="list-style-type: none"> <li>• Aesthetically more pleasing, timber floor could be self-finished</li> <li>• Easy to locate services or pipework</li> <li>• Ease of access for maintenance of services or pipe work</li> <li>• Lightweight, does not need heavy duty lifting equipment</li> <li>• Easier to adapt and alter during and after installation</li> </ul> <p>Disadvantages</p> <ul style="list-style-type: none"> <li>• Fixing of insulation is more complex</li> <li>• Requires ventilation</li> </ul>	(9)

		<ul style="list-style-type: none"> <li>• Could be subject to dry rot</li> <li>• Could be subject to infestation</li> <li>• Timber can warp and twist creating noisy floors</li> <li>• Excessive alteration for services can affect the structural integrity</li> </ul> <p><b>Accept any other valid responses.</b></p>	
Level	Mark	Descriptor	
	0	No material deserving of reward.	
1	1–3	Basic argument for both types of floor identified, or only one floor type considered in more depth. The answer is likely to be in the form of a list. Points will be superficial/generic and not applied/directly linked to the options available to the developer. The learner demonstrates a basic understanding of concrete beam and block floors and suspended timber floor construction.	
2	4–6	Arguments for and against each floor type are given, but there will be more emphasis on one floor type for the housing development. The answer will be unbalanced. There is a little or unfocused justification of the question, but the link will not always be clear. The learner demonstrates a good understanding of concrete beam and block floors and suspended timber floor construction.	
3	7–9	Developed consideration of both floor types, for and against. Comments justified and linked clearly to the consideration of arguments for and against, and their relative importance to the situation. The majority of points will be relevant and there will be a clear link to the housing development. The learner demonstrates a developed understanding of concrete beam and block floors and suspended timber floor construction.	



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

Pearson Education Limited. Registered company number 872828  
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

