Rewarding Learning

General Certificate of Secondary Education
2011

Construction and the Built Environment

Assessment Unit 1

assessing

The Construction Industry for the 21st Century

[GCB11]

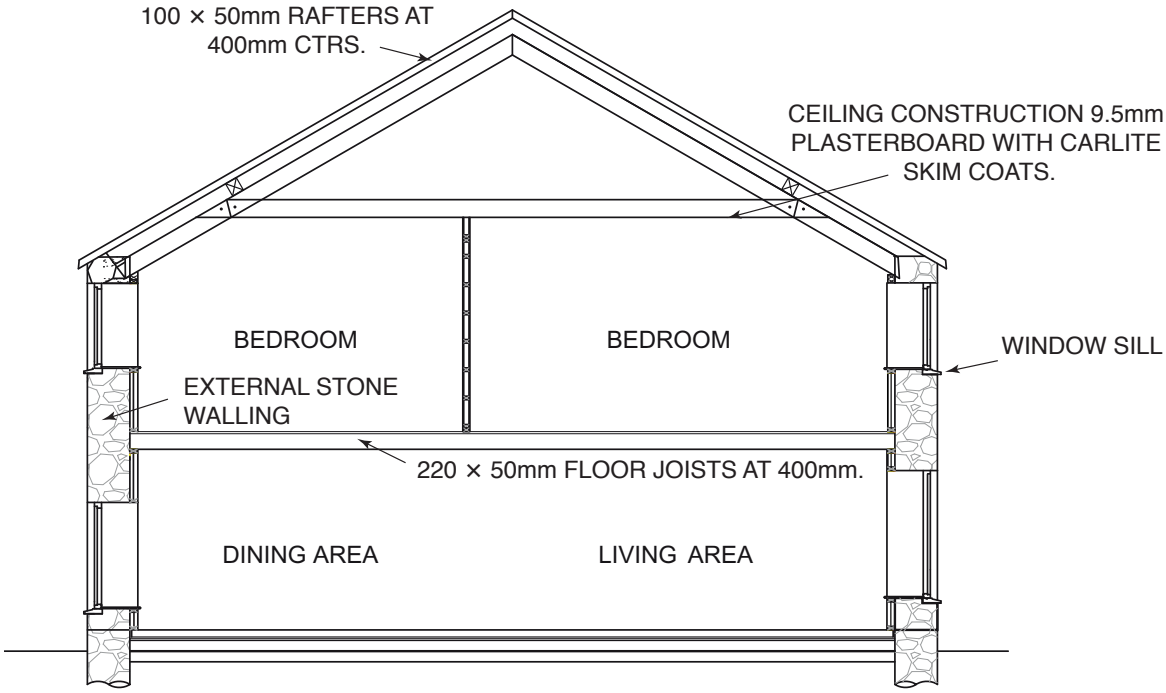
MONDAY 16 MAY, AFTERNOON

MARK SCHEME

Section A
Answer all Questions

AVAILABLE MARKS

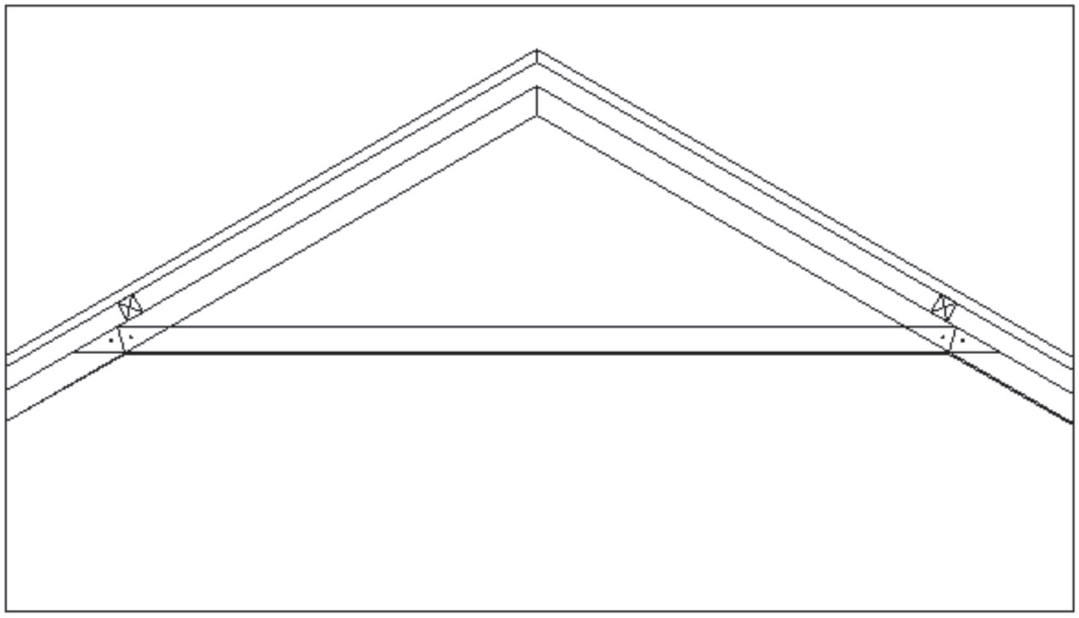
1 (a) 220 mm x 50 mm floor joists
Rafters
External stone walling
Window sill
Ceiling constructed from 9.5 mm plasterboard



[1] Per response up to a maximum of [5] [5]

(b)

AVAILABLE MARKS



Correct sketch of roof truss including collar tie, purlin and rafter correctly proportioned. [6]

Correct sketch of roof truss including collar tie correctly and purlin correctly proportioned. [5]

Correct sketch of roof truss including collar tie correctly proportioned. [4]

Correct sketch of roof truss or collar tie or purlin or rafter correctly proportioned. [2]

Correct sketch of roof truss or collar tie or purlin or rafter not correctly proportioned. [1] [6] 11

2 Candidates should relate the following responses to the pre-release, including issues related to the barn conversion.

AVAILABLE MARKS

(a) Client

Any **three** from the following or other appropriate response:

- Owner or lease of the site (Barn).
- Advise on the requirement of the barn conversion (create a brief).
- Advise of financial limitations of the proposed development.
- Advise on desired time frame. [3]

[1] per principle role, up to a maximum of [3]

Any **three** from the following or other appropriate response:

(b) Electrician

Any **three** from the following or other appropriate response:

- Plan Barn conversion with regards to electrical requirements.
- Provide electrical supply to building.
- Install conduit in stud walls which forms dry lining to barn.
- Install first fix cables.
- Fix face plates and other electrical components.
- Connect newly installed circuits to mains supply using a consumer unit.
- Test all electrical work.
- Provide test certificate and hand over building. [3]

[1] per activity up to a maximum of [3]

(c) Plumber

Any **three** from the following or other appropriate response:

- Plan Barn conversion with regards to water supply and waste management requirements.
- Provide water and waste supply to barn conversion.
- Install pipes in stud walls, floor joists which form inner lining to barn.
- Connect newly installed sanitary and kitchen appliances to mains supply.
- Test all plumbing work for both sanitary and waste system.
- Provide test certificate and hand over building.

[1] per activity up to a maximum of [3] [3] 9

3 For each of the following answers the dimensions must be accurate and given in millimetres only to receive the [2] marks.

If a dimension is provided within tolerance or with an incorrect unit then only [1] mark will be given.

(a) The length and width of the living / dining area.

Length 10800mm Width 6800mm [4]

The length and width of the toy room.

Length 3400mm Width 3400mm [4]

Tolerance on scaled dimension +/− 100mm

(b) The overall width of the house from the outside of the walls.

Width 11400mm [2]

Tolerance on scaled dimension +/− 100mm

(c) The width and height of the window in the living area at the front of the house. Take this height at the highest point of the window.

Width 2850mm Height 1800mm [4]

Tolerance on scaled dimension +/− 100mm

(d) The total floor area of the Lobby

Floor area 6500mm × 1150mm = 7.48 metres square [2]

Tolerance on calculated area +/− .5 metres square

(e) The floor to ceiling height of the bedrooms at their highest point?

Height 3000mm [2]

AVAILABLE MARKS

18

4 **(a)** Name the type of building structure shown in Fig 2.

AVAILABLE MARKS

Rectangular steel framed structure [2]

Steel framed structure [1] [2]

(b) List **five** examples of the type of building occupancy which this type of structure would be used for.

Any **five** from the following or other appropriate response.

School

Hospital

Office Block

Apartments / Flats

Hotel

[1] Per building occupancy up to a maximum of [5] [5]

(c) Why is this type of structure suitable for the types of building occupancies listed above.

Any **three** from the following or other appropriate response.

A framed structure is a network of beams and columns joined up to form the skeleton framework of the building.

The skeleton framework makes a number of small rooms suitable for occupancy.

The structural frame carries the total load of the building and transfers it to the foundation.

Cladding is fixed over the framework, or infill panels are placed between its members, to totally enclose the space within the building.

[1] Per activity up to a maximum of [3] [3]

(d) List **three** advantages of using a steel framed structure.

Any **three** from the following or other appropriate response.

Member can be pre-fabricated off-site.
Fast erection on-site.
Framed structures are easily erected from pre-made members.
These members are easily connected together in the correct sequence to form the structural framework.
Cost.
Many floors.

[1] Per activity up to a maximum of [3] [3]

13

5 List **three** different materials used by a plumber and give **two** examples of where each of them could be used in the construction of a typical domestic dwelling.

AVAILABLE MARKS

Any **three** materials from the following list [1] each and a further [2] for suitable uses of the materials.

Material Copper
Use Piping
Connections to be soldered

Material Mild Steel
Use Piping
Radiators

Material Lead
Use Flashing
Dressings round windows

Material Plastic
Use Waste pipes
Traps

Or any other appropriate response. 9

Section B

AVAILABLE MARKS

6 **(a)** List **four** main resources required to undertake any construction project whether the project is large or small.

1 Finance

2 Plant

3 Labour

4 Materials

5 Time

[1] Per resource up to a maximum of [4]

(b) Demonstrate a knowledge and an understanding of **two** of the above types of resources as they could be applied to the barn conversion shown in the pre-release materials.

(1-&-2) [4] for a response which shows an understanding of either Plant, Labour, Materials or Finance.

$[4] \times 2 = [8]$

Finance is required by the Client to purchase the Barn.
Monthly payments would be made to the contractor to carry out renovations.
Finance would also be required to pay for other statuary requirements such as Planning permission or Building Control approval.

Plant will be required for various types of operations on site such as digging out trenches for drains and a telescopic handler for lifting heavy objects to higher levels such as the roof tiles for the barn.

Labour is required to carry out the construction of the project.
The following type of labour would be employed; site management team, trade operatives i.e. Joiners, bricklayers, plumbers and stone masons.

Materials include all resources required to carry out the barn conversion project such as cement, timber, glass etc.

Time required to carry out the construction project, impact on cost, realistic time for the project.

12

7 **(a)** List **five** of the main stages in the construction cycle.

AVAILABLE MARKS

1 Planning

2 Design

3 Tendering

4 Construction processes

5 Handover

6 Evaluation

[1] Per stage in the construction cycle up to a maximum of [5] [5]

(b) **One** of these stages should reflect the process of calculating a cost for the construction. Explain in detail how this process is managed from a contractors and client's perspective.

The following points should be considered in relation to tendering:
Preparation of drawings.
Measuring resources required to prepare a bill of quantities.
Preparation of bill of quantities.
Invitation to a select list of contractors to tender.
Tender prepared by contractor and contract price established.
Return of tender by a specified time and at a specified location.
Open of tender documents.
Verification of tender.
Contract awarded.

Level 1 ([1]-[4])
Candidate identifies the tender process using at least two of the above processes (or has included other appropriate responses). Their level of accuracy for spelling, punctuation and grammar is limited. They discuss the tender process in a limited form and style of writing. Their discussion is not fully coherent or organized and there is little use of specialist terms.

Level 2 ([5]-[7])
Candidate identifies the tender process using at least three of the above processes (or has included other appropriate responses). Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss the tender process using a satisfactory form and style of writing. Their discussion is coherent or organized in most cases they use a range of specialist terms.

Level 3 ([8]-[10])
Candidate identifies the tender process using at least four of the above processes (or has included other appropriate responses as well). Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss the tender process using an excellent form and style of writing. Their discussion is coherent and very well organized and they use a wide range of specialist terms.

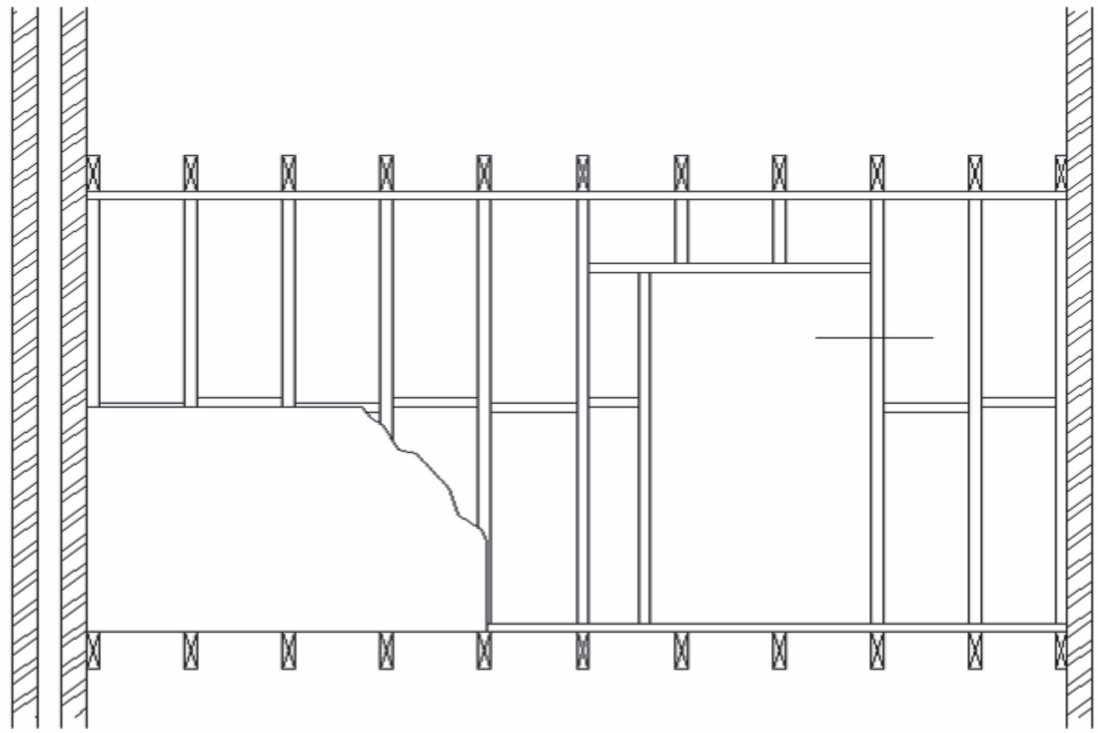
When a response is not worthy of credit a [0] mark should be awarded. (AO1 [5], AO2 [5]) [10]

AVAILABLE MARKS

15

8 **(a)** Drawing should be completed as shown with no annotations. Allowance will be made for regional variations.

AVAILABLE MARKS



[1] Mark for completing the sole plate correctly
[1] Mark for completing the head plate correctly
[2] Marks for the correct positioning of vertical studs
[1] Mark for showing the correct position of noggin pieces
[2] Marks for showing a door opening in approximate proportion
[2] Marks for showing the correct arrangement of studs above the door opening
[1] Mark for showing some wall coverings
[2] Marks for a well presented drawing

[1] or [2] for each correctly added part of a drawing up to a maximum of [10]

[10]

(b) What is the typical spacing of the vertical uprights?

400mm centres [2]

Answer has to be correct to get [2] marks, part answer will +/− 50mm [1] mark

(c) Name **one** common construction material used to sheet the sides of stud walls in preparation for plastering?

Plaster board
Plywood
[1] Mark per material up to a maximum of [1]

AVAILABLE MARKS

13

9 The external walls of the barn shown in the pre-release material are constructed using solid Basalt stone.

AVAILABLE MARKS

The way in which walls are constructed for dwellings has changed considerably over the last one hundred years in the United Kingdom. Using notes and annotated sketches show some of the stages in the development of wall construction.

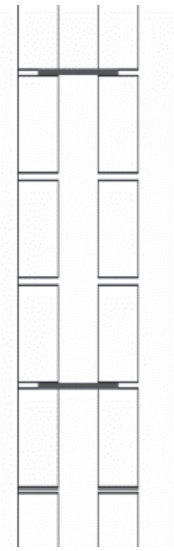
The following points may help you with your answer.

Stone Wall
Solid brick walls
Cavity wall construction
Cavity walls with insulation

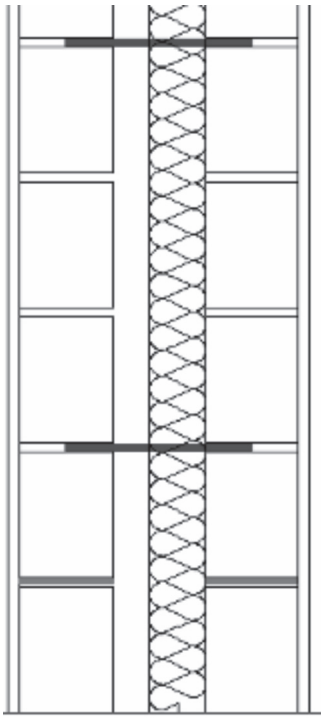
Stone wall construction

Traditional walls of dwellings and industrial buildings were constructed from stone which was found locally.
Larger stones were built in courses with small stones interspaced.
The walls were usually very thick at about 400 to 700mm in width.
Most had no damp proof course included.
Some of these stone walls were built with lime or more recently with sand and cement.
The barn shown in the pre-release materials is constructed from solid stone with brick around the windows.

One brick thick walls were commonly used to build rows of red brick terrace houses in close proximity to mills.
These houses were constructed cheaply by mill owners from bricks which were usually made locally.
These bricks were often constructed in English Bond creating a solid wall.
The solid wall allowed moisture to travel from the outside of the wall to the inside causing damp patches on the wall inside the house.
Damp proof courses were included in some of the one brick walls.



Cavity walls were the first development to prevent the spread of damp into the inside of buildings.
These walls were constructed from two skins of brick or block joined together by twisted galvanized steel wall ties.
The twist was constructed into the wall ties so that any moisture which tried to move across the cavity would drop off.



This wall is similar in construction to the first cavity wall, the only exception being the inclusion of insulation.
Wall ties are now manufactured from stainless steel.
When cavity walls are used as part of a cellular structure they provide buildings which are structurally sound.
Some of their other advantages are the prevention of damp penetrating to the inside of the building, fairly good thermal insulation properties and a cost efficient method of construction.

[3] Per sketch up to a maximum of [10] [10]

Level 1 ([1]-[4])
Candidates show the two methods of construction covering few of the attributes listed above (or have included other appropriate responses). Their level of accuracy for spelling, punctuation and grammar is limited. They compare two methods of construction using a limited form and style of writing. Their comparison is not fully coherent or organized and there is little use of specialist terms.

Level 2 ([5]-[7])
Candidates show the three methods of construction covering some of the attributes listed above (or have included other appropriate responses). Their level of accuracy for spelling, punctuation and grammar is satisfactory. They compare three methods of construction using a satisfactory form and style of writing. Their comparison is coherent or organized in most cases they use a range of specialist terms.

Level 3 ([8]-[10])
Candidates show the four or more methods of construction covering the majority of the attributes listed above (or have included other appropriate responses as well). Their level of accuracy for spelling, punctuation and grammar is excellent. They compare four methods of construction using an excellent form and style of writing. Their comparison is coherent and very well organised and they use a wide range of specialist terms.

When a response is not worthy of credit a [0] mark should be awarded.
(AO3 [20]) [10]

AVAILABLE MARKS
20
120

Total