

**General Certificate of Secondary Education** 2015

## **Construction and the Built Environment**

Assessment Unit 1 The Construction Industry for the 21st Century

## [GCB11] **THURSDAY 11 JUNE, MORNING**

#### TIME

1 hour 30 minutes.

#### **INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper. Answer all eleven questions.

Questions 1, 2, 3, 8 and 9 should be answered in relation to the enclosed house drawings and specifications previously issued as pre-release material.

You should not bring any of the material previously issued into this examination.

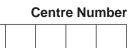
You will be provided with a clean copy of the pre-release material.

#### **INFORMATION FOR CANDIDATES**

The total mark for this paper is 120.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question. Quality of written communication will be assessed in questions 8 and 10.

#### A scale ruler is required.



**Candidate Number** 





| For Examiner's use only |       |  |
|-------------------------|-------|--|
| Question<br>Number      | Marks |  |
| 1                       |       |  |
| 2                       |       |  |
| 3                       |       |  |
| 4                       |       |  |
| 5                       |       |  |
| 6                       |       |  |
| 7                       |       |  |
| 8                       |       |  |
| 9                       |       |  |
| 10                      |       |  |
| 11                      |       |  |
| Total<br>Marks          |       |  |

### Section A Examiner Only Marks Remark Answer all questions Use the pre-release material house drawing and images to assist with answering questions 1, 2, 3, 8 and 9. (a) List below the external finishes used on the outside of the walls shown in the pre-release material. 1. [1] 2. \_\_\_\_\_ [1] (b) List below seven functions of a cavity wall. 1. \_\_\_\_\_ [1] 2. \_\_\_\_\_ [1]

5. \_\_\_\_\_ [1] 6. [1] 7. \_\_\_\_\_ [1]

3. \_\_\_\_\_ [1]

4. \_\_\_\_\_ [1]

(c) Bonding of brickwork is the arrangement of the bricks / blocks in a wall, column or pier which will give maximum overlap and no continuous vertical joints.

State two reasons why it is good practice to bond bricks in a wall.

| 1 |     |
|---|-----|
|   | [1] |
| 2 |     |
|   | [1] |

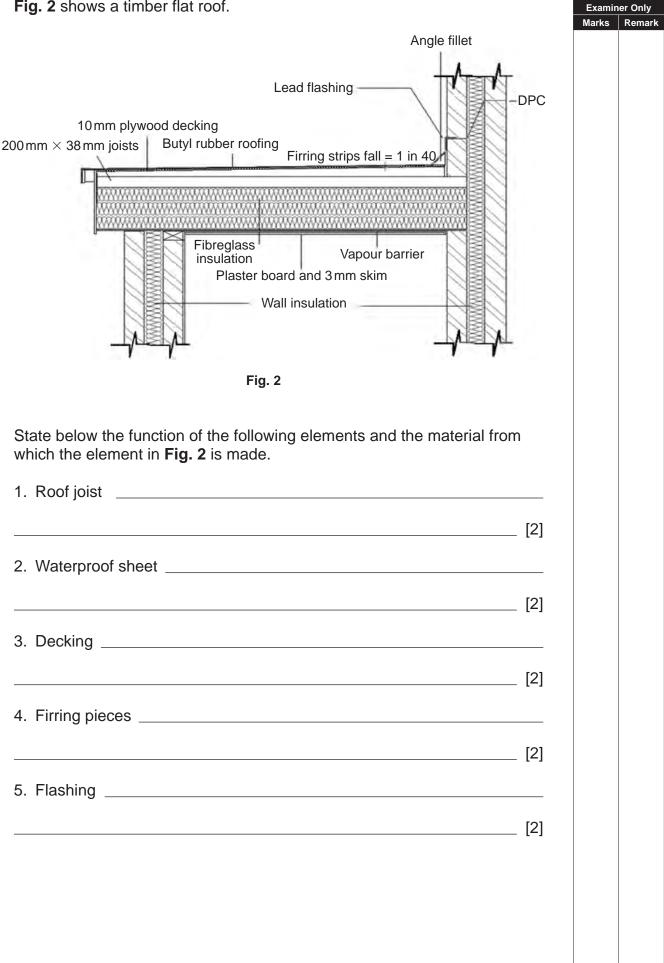
1

| 2 | (a) | Identify <b>three</b> of the main roles that a Building Services Engineer would have in relation to the building shown in the pre-release material. |       | Examin<br>Marks | er Only<br>Remark |
|---|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------|-------------------|
|   |     | Building Services Engineer                                                                                                                          |       |                 |                   |
|   |     | 1                                                                                                                                                   |       |                 |                   |
|   |     |                                                                                                                                                     |       |                 |                   |
|   |     | 2                                                                                                                                                   |       |                 |                   |
|   |     | 3                                                                                                                                                   |       |                 |                   |
|   |     |                                                                                                                                                     |       |                 |                   |
|   | (b) | Identify <b>three</b> of the main roles that the following craft operatives would have for the project shown in the pre-release material.           |       |                 |                   |
|   |     | Plumber                                                                                                                                             |       |                 |                   |
|   |     | 1                                                                                                                                                   |       |                 |                   |
|   |     | 2                                                                                                                                                   |       |                 |                   |
|   |     | 3                                                                                                                                                   |       |                 |                   |
|   |     |                                                                                                                                                     | _ [3] |                 |                   |
|   |     | Electrician                                                                                                                                         |       |                 |                   |
|   |     | 1                                                                                                                                                   |       |                 |                   |
|   |     | 2                                                                                                                                                   |       |                 |                   |
|   |     | 3                                                                                                                                                   |       |                 |                   |
|   |     |                                                                                                                                                     |       |                 |                   |
|   |     |                                                                                                                                                     |       |                 |                   |
|   |     |                                                                                                                                                     |       |                 |                   |

| 3 | (a) |       | ng the attached pre-release material give the following internal m dimensions in millimetres. | Examin<br>Marks | er Only<br>Remark |
|---|-----|-------|-----------------------------------------------------------------------------------------------|-----------------|-------------------|
|   |     | Sor   | ne dimensions may need to be scaled.                                                          |                 |                   |
|   |     | (i)   | The length and width of the living room.                                                      |                 |                   |
|   |     |       | Length mm Width mm [4]                                                                        |                 |                   |
|   |     | (ii)  | The overall length of the dwelling.                                                           |                 |                   |
|   |     |       | Length mm [2]                                                                                 |                 |                   |
|   |     | (iii) | The length and width of bedroom 1.                                                            |                 |                   |
|   |     |       | Length mm Width mm [4]                                                                        |                 |                   |
|   |     | (iv)  | What is the overall width of the external doors in the living room?                           |                 |                   |
|   |     |       | mm [2]                                                                                        |                 |                   |
|   | (b) |       | w many 1200 mm wide windows are in the ground floor of the elling?                            |                 |                   |
|   |     |       | [2]                                                                                           |                 |                   |
|   |     |       |                                                                                               |                 |                   |
|   |     |       |                                                                                               |                 |                   |
|   |     |       |                                                                                               |                 |                   |
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|   |     |       |                                                                                               |                 |                   |
|   |     |       |                                                                                               |                 |                   |
|   |     |       |                                                                                               |                 |                   |

| When lifting any small heavy object it is important to use the correct technique, which is known as the <b>kinetic handling technique</b> . | Examiner Only<br>Marks Remark |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
|                                                                                                                                             |                               |
| Fig. 1                                                                                                                                      |                               |
| Write out the following <b>3 steps in the correct order</b> for a person lifting a 20 kg box of ironmongery.                                |                               |
| I. Position the load in its new location                                                                                                    |                               |
| II. Grip firmly using the whole hand and not just the finger tips, while keeping your back straight                                         |                               |
| III. Lift the load using your legs not your back                                                                                            |                               |
| Step 1                                                                                                                                      |                               |
| [1]                                                                                                                                         |                               |
| Step 2                                                                                                                                      |                               |
| [1]                                                                                                                                         |                               |
| Step 3                                                                                                                                      |                               |
| [1]                                                                                                                                         |                               |
|                                                                                                                                             |                               |
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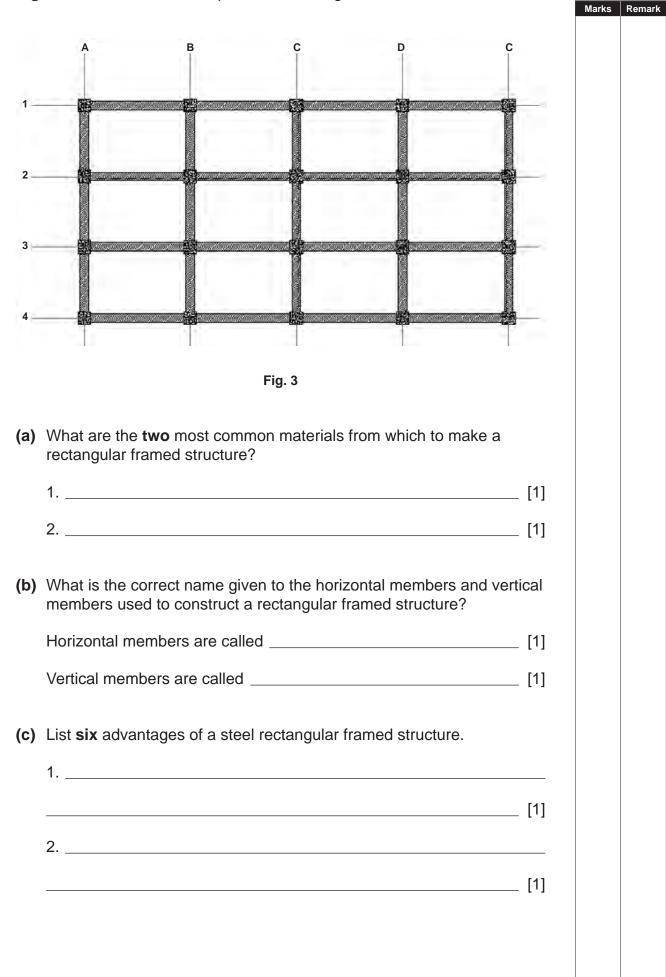
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(Questions continue overleaf)

Examiner Only



|     | 3                                                                                            |       |        |
|-----|----------------------------------------------------------------------------------------------|-------|--------|
|     |                                                                                              |       | lemark |
|     | 4                                                                                            |       |        |
|     |                                                                                              |       |        |
|     | 5                                                                                            |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     | 6                                                                                            |       |        |
|     |                                                                                              | _ [1] |        |
| (d) | Complete the sketch in <b>Fig. 4</b> for the base detail for a rectangular framed structure. |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     | <b>Fig. 4</b>                                                                                |       |        |
|     | Fig. 4                                                                                       | [5]   |        |
| (e) | List the <b>two</b> most common methods used to join a steel framed structure.               |       |        |
|     | 1                                                                                            | _ [1] |        |
|     | 2                                                                                            | [1]   |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |
|     |                                                                                              |       |        |

| 7 | (a) | List <b>two</b> materials from which windows are commonly made. |       | Examir | ner Only |
|---|-----|-----------------------------------------------------------------|-------|--------|----------|
|   |     | 1                                                               | _ [1] | Marks  | Remark   |
|   |     | 2                                                               | _ [1] |        |          |
|   | (b) | List four performance requirements of a sliding sash window.    |       |        |          |
|   |     | 1                                                               | _ [1] |        |          |
|   |     | 2                                                               | _ [1] |        |          |
|   |     | 3                                                               | _ [1] |        |          |
|   |     | 4                                                               | _ [1] |        |          |
|   |     |                                                                 |       |        | 1        |

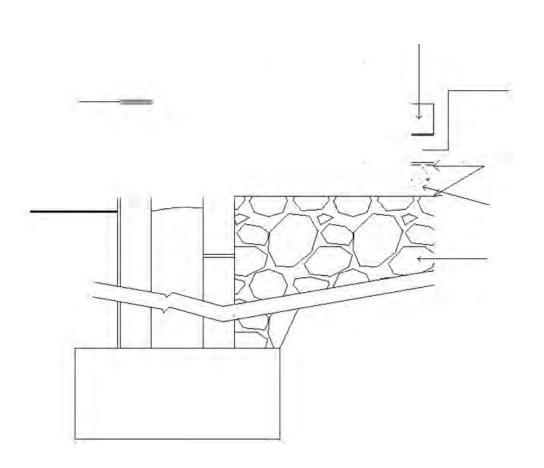
|            | Answer <b>all</b> questions                                                                                                                                                                                                                                                                                     | Marks |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Sus<br>he  | stainable development in the countryside is underpinned by the work of Planning Service in NI.                                                                                                                                                                                                                  |       |
| con<br>eve | alyse the pre-release material and discuss why the architect in<br>nsultation with the client has encouraged <b>excavation to a reduced</b><br><b>rel</b> before commencing construction and has chosen the <b>specified</b><br><b>ishes and location</b> . You should also consider the style of the dwelling. |       |
|            |                                                                                                                                                                                                                                                                                                                 |       |
|            |                                                                                                                                                                                                                                                                                                                 |       |
|            |                                                                                                                                                                                                                                                                                                                 |       |
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|            |                                                                                                                                                                                                                                                                                                                 |       |
|            | [10]                                                                                                                                                                                                                                                                                                            |       |

Examiner Only

- **9 Fig. 5** below shows an incomplete detail of a foundation / floor / rear wall of the dwelling similar to the one shown in the pre-release material.
  - (a) Complete the drawing.
  - (b) Add the annotations from the list below.

#### You will need to insert some additional arrows.

| Outer skin of block work | Cavity Insulation   |      |
|--------------------------|---------------------|------|
| Inner skin of block work | 100 mm floor screed |      |
| 100mm floor insulation   | D.P.M.              |      |
| Existing Ground Level    | D.P.C.              |      |
| 100mm concrete subfloor  | Hardcore            |      |
| Wet dash                 | Internal Plaster    | [10] |







Examiner Only Marks Remark

| Embodied energy is the <b>SUM</b> o<br>lifecycle of a material.                                         | of <b>ALL</b> the energy required throughout the                                                                                                                                    | e          |  |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|
| Discuss the term "Embodied Er<br>mined in Brazil, and used for pi<br>the full life span of the hospital | nergy" as it relates to copper, which is<br>ipes in a new hospital in Belfast. Discuss<br>in Belfast including demolition. The copp<br>razil at a location which is in close proxim | er<br>iity |  |
|                                                                                                         |                                                                                                                                                                                     |            |  |
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|                                                                                                         |                                                                                                                                                                                     |            |  |

**10** In demonstrating a knowledge and understanding of the need to reduce

Examiner Only

11 Fig. 6 shows a simple strip foundation excavated in boulder clay. Examiner Only Marks Remark Top soil is taken away Artificial foundation Natural foundation Fig. 6 (a) State why this type of foundation is called a strip foundation, and name the material from which it is normally made. \_\_ [2] (b) Define Dead Loads and give at least one example as it relates to a multi storey hospital building. \_\_\_\_ [2]

| (c) | Define <b>Imposed Loads</b> and give at least <b>one</b> example of an imposed load when related to a <b>three storey library building</b> . |    | Examine<br>Marks | r Only<br>Remark |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------|----|------------------|------------------|
|     |                                                                                                                                              | _  |                  |                  |
|     | [2                                                                                                                                           |    |                  |                  |
| (d) | Define Bearing Capacity in the substrata when related to a steel framed factory building constructed on reclaimed land near the coast.       | -] |                  |                  |
|     |                                                                                                                                              | _  |                  |                  |
|     | [2                                                                                                                                           | 2] |                  |                  |
| (e) | State what a <b>Profile Board</b> would be used for and give the name of the <b>material</b> from which it is normally made.                 |    |                  |                  |
|     |                                                                                                                                              | _  |                  |                  |
|     | [2                                                                                                                                           |    |                  |                  |
|     |                                                                                                                                              |    |                  |                  |
|     |                                                                                                                                              |    |                  |                  |
|     | THIS IS THE END OF THE QUESTION PAPER                                                                                                        |    |                  |                  |

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#### Introduction

A copy of the Pre-Release Material is included in the following pages.

The Pre-Release Material contains an A3 drawing, photographs and specifications relating to a dwelling. Photographs 1–5 relate to the floor plan included (Drawing 1). This dwelling has been constructed close to a scenic mountain range on the edge of a small village.



#### Photograph 1

The landowner is a private client who has employed the following people to oversee the design of his development:

Architect Building Services Engineer Quantity Surveyor Contractor

The Contractor will employ the following team:

Site Engineer/Manager Plasterers Joiners Electricians Plumbers

Your client has strict planning guidelines with which he must comply, including a maximum ridge height, and external wall finishes.

#### Specification

#### **Cavity Wall construction**

Outer leaf: 100mm concrete block, 150mm cavity, 150mm insulation held in position using stainless steel insulation retaining wall ties to BS 1243.

Inner leaf: 100 mm concrete block work. Provide sand/cement plaster and carlite finish to inner face. Wall ties to be spaced at 750 mm horizontally, 450 mm vertically and un-bonded jambs ties to be spaced 300 mm vertically. 25 mm insulation to all jambs, between lintels and behind sill. D.P.C. in front of insulation in each case.

#### **External Finishes walls**

The front elevation is to be faced with a 200 mm skin of natural stone sourced from the local area, in keeping with surrounding rock types.

Remaining external walls to be wet dash, painted white.

#### **External finishes roofs**

Natural slate in standard sizes. Dark brown plastic fascia board. Dark brown 100 mm half round gutter.

#### Window

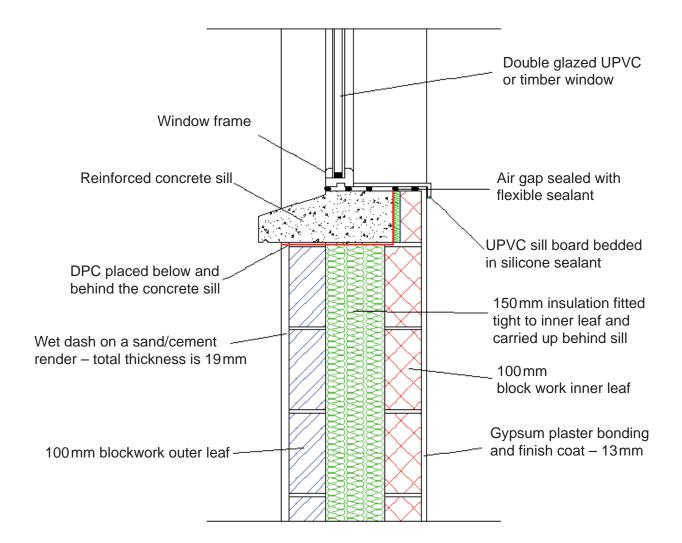
Dark brown plastic windows. Dormer window structure sheeted with white plastic cladding.

Photograph 3

#### Solid floor construction

Seal all floors with two coats of penetrating liquid dust proofer, 100 mm fine aggregate screed, 100 mm high density floor insulation. Visqueen 1200 grade D.P.M., 100 mm concrete sub-floor, 150 mm consolidated hard core.





#### Damp proof course

Vertical D.P.C.'s to all window and external door jambs, horizontal D.P.C. behind and under sills and stepped lintels. Wall D.P.C.'s to external skin, layers at 150 mm minimum above finished ground levels.

D.P.C.'s to internal walls to overlap and be bonded to floor D.P.M. by a minimum of 215 mm.

#### Foundations

600 mm x 300 mm foundations to 300 mm walls.

450 mm x 300 mm foundations to 100 mm walls.

The above to be concrete strip foundations. The size and depth of foundations shown to be determined and agreed with Building Control when sub/soil bearing pressures are known. Cavity fill to external walls to stop a minimum of 150 mm below D.P.C.

## Photograph of a window as constructed on site for the external elevation



Photograph 4

# Photograph of Window B as constructed on site for the internal elevation



Photograph 5



#### Photograph 6

Dry stone wall used to construct the boundary fence around the garden.



Excavation to reduce levels in preparation for construction of the dwelling.

Photograph 7



General Certificate of Secondary Education

### **Construction and the Built Environment**

**Pre-Release Material** 

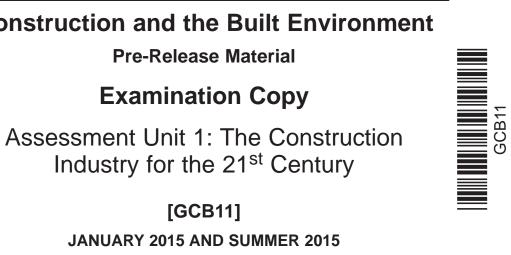
### **Examination Copy**

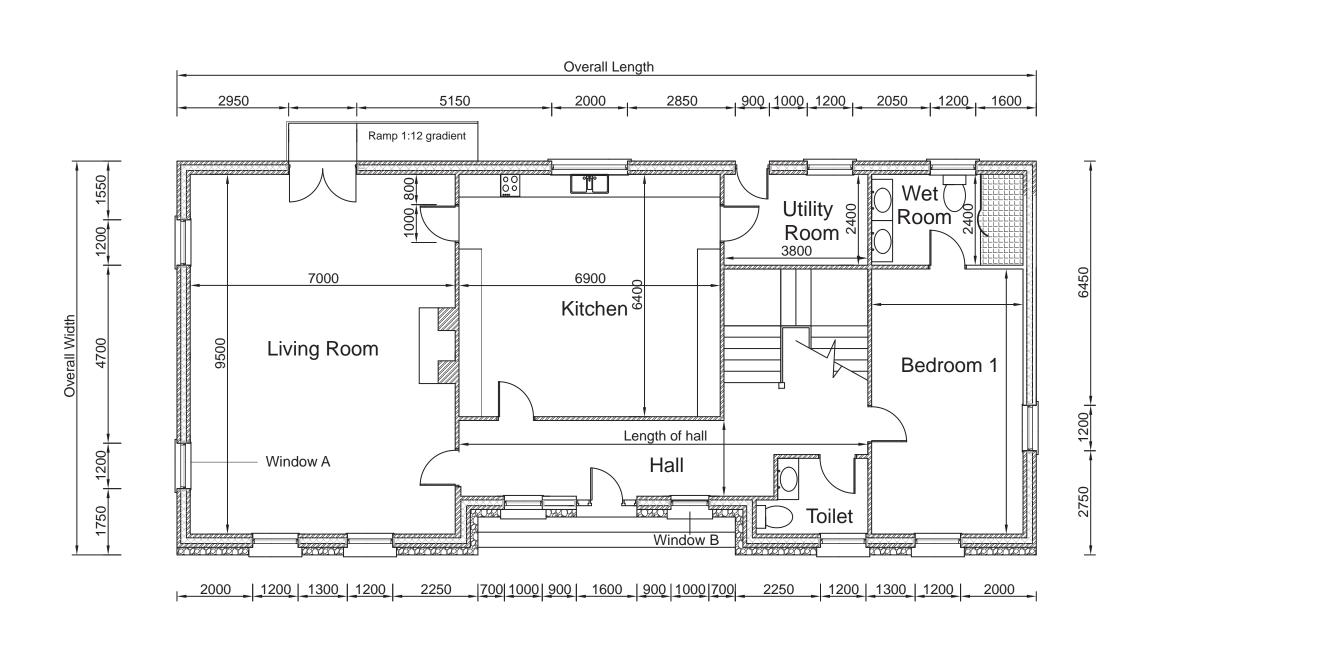
Industry for the 21<sup>st</sup> Century

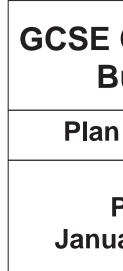
# [GCB11]

You must use this clean copy of the Pre-Release Material, in the examination and not your own annotated copy.

NOTE: Students will require the use of a scale ruler during the examination.







# GCSE Construction and the Built Environment

## Plan View Drawing No 1

## Unit 1

Pre-Release Material January 2015 - Summer 2015 SCALE: 1: 100