C023/SQP297

Building Construction
Higher

NATIONAL QUALIFICATIONS

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SCOTTISH QUALIFICATIONS AUTHORITY

COURSE ASSESSMENT SPECIFICATION

BUILDING CONSTRUCTION HIGHER

The purpose of this document is to provide:

- Details of the structure of the Question Paper and Project in this Course.
- Guidance to centres on how to use information gathered from the Question Paper and Project in this Course to estimate candidate performance.

Part 1

This part of the Course Assessment Specification details the structure of the Question Paper in this Course.

Question Paper

- The question paper will be of 2 hours duration, set and externally marked by SQA.
- The paper will have a total of 100 marks.
- The paper will consist of two sections, A and B.
- The paper assesses the candidate's ability to retain and integrate knowledge and understanding from across two Units of the Course content namely *Site Establishment and Substructure* and *Components and Finishes*. The Unit on *Superstructure* is **not** assessed in the Question Paper.
- The paper can assess candidate's knowledge and understanding in domestic building contexts only.

Section A – total marks available 40

This section consists of short answer and/or restricted response questions examining the candidate's knowledge and understanding of construction principles, processes and materials. All questions in Section A are compulsory.

Section B – total marks available 60

This section will consist of 3-6 structured and/or extended response questions examining the candidate's knowledge and understanding of building construction and technological processes.

Candidates are given an option with regard to the questions to answer in this Section. They must answer two questions, each with a value of 30 marks, to give a total of 60 marks. Each question requires an extended response. The number of questions in this section of the Paper may change from year to year, but will always be between three and six.

Part 2

This part of the Course Assessment Specification details the structure of the Project.

There are 100 marks available for the Project. The purpose of the project is to assess the candidate's ability to apply skills, knowledge and understanding to develop a construction technology solution for a given brief. It will focus on knowledge and skills developed in the *Superstructure* Unit only. In particular, it will test the candidate's ability to communicate, generate and refine potential solutions and to produce a final proposal for a small housing scheme or dwelling house. Candidates will acquire practical research skills in research, as well as planning, implementing and reviewing that research and the subsequent report.

The Project will deal with the section in the Course which covers *Superstructure.* The Project will **not** test *Site Establishment and Substructure* or *Components and Finishes*.

It is anticipated that candidates will carry out the bulk of their project work in a supervised project room. The project materials will be prepared in an open-book environment with candidates permitted to collaborate and co-operate in their research and information gathering. This research and information gathering may, by its very nature, be undertaken outwith the project room environment. The compiling of the project folio and the production of graphic information as part of the project must be carried out by each candidate individually. Assessors must be satisfied that the project presented by each candidate for assessment is the work of the individual candidate.

The Project task will be devised by the centre, based on SQA Assessment Guidance. The Project will be conducted internally under supervision and externally marked by SQA. The SQA will require submission of the completed projects by April in the year of presentation (the precise date will be issued at the start of each session in the Operational Guide).

Project Specification

Task 1

Examine the given brief. Produce a feasible project plan which will identify the sequence of activities, set clear time scales for the completion of stages of the project and provide a method of recording progress. 8 marks

The project plan should be 300 to 500 words in length, plus any additional graphical/ diagrammatic information.

Task 2

In a concise report, outline your proposals for the form of construction you have selected for the dwellings including the materials you propose to use for the walls and roof construction.

Your report must clearly justify the form of construction and materials in terms of functional requirements and performance. 12 marks

Task 3

In technical terms, outline in a schedule the sequence of construction of one dwelling house.
Your schedule should include all the health and safety issues to be considered during construction of the house. 14 marks

Task 4

Prepare annotated sketches to an approximate scale of 1:5 to show any **four** of the following construction details:

- junction of an upper floor and external wall
- eaves detail (junction of pitched roof and external wall) for cold roof construction
- eaves detail (junction of pitched roof and external wall) for warm roof construction
- parapet wall detail for a flat roof
- horizontal cross section at a party wall 4 x 15 = 60 marks

Task 5

Prepare a brief evaluation on the completed project. 6 marks

All reports for the various Tasks should be submitted on A4 paper.

Throughout the project, candidates should retain and submit all evidence, from rough sketches through to final drawings.

SQA will provide flyleaves similar to the sample in this document. A flyleaf should be attached to each project, detailing component marks noted and verified by the teacher/lecturer. The declarations must be signed by both candidate and teacher/lecturer.

Centres should aim to complete the project by April. The precise submission date will be confirmed each session in the Operational Guide. This will allow time for central moderation to take place and for centres to be contacted should any issues arise during moderation.

Guide to Project Tasks

A clear and detailed Brief for a small development of approximately ten new houses should be issued and discussed with candidates. Candidates should be able to ask questions at this stage and amend or amplify the brief after consultation with the teacher/lecturer acting as Client.

Task 1

It should be made clear to candidates that the plan asked for concerns how the candidate intends to organize the **project**. A bar chart or programme plan for the proposed building works is **not** required. Candidates should be encouraged to keep a diary of progress through each task. This should be compared by the candidate with the original plan and aid in the subsequent evaluation.

Task 2

Candidates should be asked to prepare a concise report outlining their choice of construction for the walls and roof of the dwelling houses. The report should detail materials they propose to use for the building. Samples of manufacturer's literature should be included in the project folio as an appendix.

The report must clearly justify the form of construction and materials used in terms of functional requirements and performance.

Task 3

Candidates should be asked to prepare a schedule outlining the sequence of construction of one dwelling house (or, if it is a semi-detached dwelling, of the two semi-detached houses together). The schedule must include details of all the health and safety issues to be considered during the construction of the house, eg precautions against falling from heights, sequencing of trades etc.

The schedule should include well prepared and annotated sketches showing the construction sequence.

Task 4

The sketches produced should be to a commercially acceptable standard and include all relevant annotation, dimensioning and hatching where appropriate.
Four sketches are required at a scale of approximately 1:5
Almost all sketches will be vertical cross sections:

- junction of an upper floor and external wall
- eaves detail (junction of pitched roof and external wall) for cold roof construction
- eaves detail (junction of pitched roof and external wall) for warm roof construction
- parapet wall detail for a flat roof
- horizontal cross section at a party wall

All surrounding construction should be shown in the sketches.

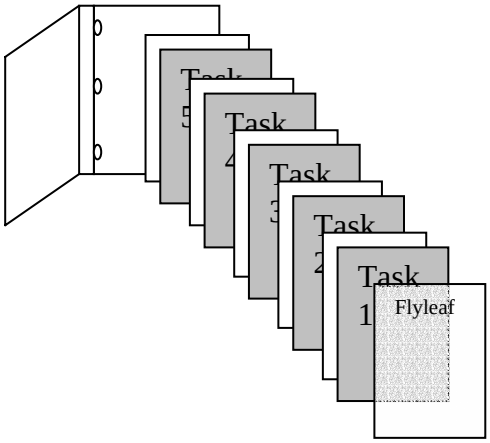
Task 5

This should allow the candidate to evaluate what has been learned as well as the extent to which the building proposals fulfil the given brief.

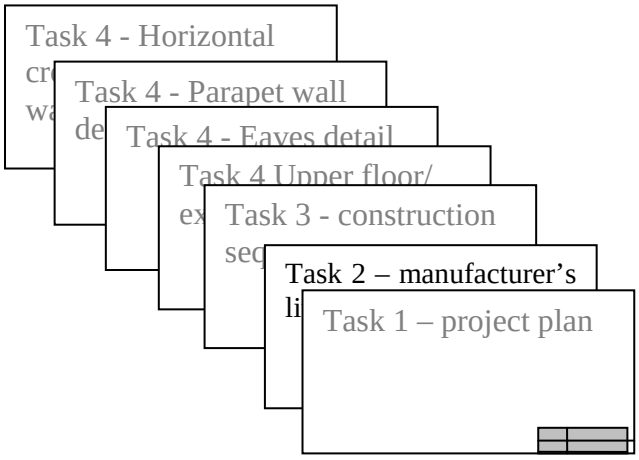
Presentation of project

The project submission should be made in two folders.

All A4 pages, whether written/typed reports or rough sketches and drawings, should be presented in one folder, with dividers clearly showing to which task each section refers. The following schematic drawing should form the model for the A4 folder, with the flyleaf at the front and all work presented sequentially:



Drawings should be collated in task order and submitted unfolded:



Drawings should be identified using a grid in the bottom right corner, based on the following example, giving the following information:

Name:	Andrew N Other
SCN:	555555555
Course:	Higher Building Construction
Task No.	4
Drawing Subject	Parapet Wall Detail
Drawing Number	3 of 4

Sample Flyleaf

EXTERNAL ASSESSMENT
INTERNALLY ASSESSED ELEMENT
Flyleaf

NATIONAL QUALIFICATIONS
2007

Building Construction

Higher

Project

Fill in these particulars

Centre Details
Full name of centre

Centre Number

Candidate Details
Forename(s)

Surname

Date of Birth
Day Month Year

Scottish Candidate Number

Declaration

This declaration must be completed by the candidate who produced the assignment and by an appropriate teacher/lecturer.

Candidate Declaration
I confirm that the materials submitted within are my own work; I confirm that I have read the *Your Coursework* booklet and understand the consequences of submitting work that is not my own/has been plagiarized from another source.

Signature _____ Date _____

Teacher/Lecturer Declaration
To the best of my knowledge, this assignment is the candidate's own work.

Signature _____ Date _____

Example Marking Schedule

Building Construction Higher

Teacher/Lecturer Assessment of Project

Candidate _____

		Maximum Marks	Mark Awarded	Official Use
1	**Report**			
	Project plan	8		
2	**Form of Construction**			
	(a) Form of construction selected and justified	6		
	(b) Materials justified	6		
3	**Sequence of construction**			
	(a) Suitable sequence of construction outlined	6		
	(b) Sketches of sequence	4		
	(c) Health and safety issues	4		
4	**Annotated sketches**			
	(a) Sketch No. 1	15		
	(b) Sketch No.2	15		
	(c) Sketch No.3	15		
	(d) Sketch No. 4	15		
5	**Evaluation**			
	Evaluation of completed project			
	(a) Evaluation of own performance	4		
	(b) Appraisal of the building proposal	2		
	Total Marks	**100**		

The "added value" of the Course

Over and above the Units, candidates will gain significant additional benefit from completing the Course: there are opportunities in the Course to integrate knowledge, understanding and to extend the skills acquired throughout the Units.

Overall, the added value of the Course is in the Course assessment providing opportunities for the candidate to demonstrate:

- *retention* of a range of knowledge, understanding and skills acquired from across all the Units
- *integration* of a range of knowledge, understanding and skills acquired from across all the Units
- the ability to demonstrate the skills of *analysis and evaluation*, in familiar and less familiar contexts, from across the Course content
- *application* of a range of knowledge, understanding and skills in *more complex* contexts
- *application* of a range of knowledge, understanding and skills in *less familiar* contexts

It is of particular value that when Units are studied as part of the Course, opportunities exist for candidates to integrate their knowledge more effectively. For example, the Unit on superstructure considers the requirement for the building to be loadbearing. This inevitably ties in with a consideration of the foundations and underbuilding of the structure. Similarly, a consideration of components and finishes must be harmonised with the structures and backgrounds into and onto which the components and finishes are respectively fixed, fitted and applied.

Part 3

This part of the Course Assessment Specification provides guidance on how to use assessment information gathered from the Question Paper and Project to estimate candidate performance.

The Course award is based on the total of the marks gained in the Question Paper and Project.

	Time allocation	Mark allocation
Paper	2 hours	100
Project	Completed during Course	100

In National Qualifications cut-off scores should be set at approximately 70% for Grade A and 50% for Grade C with Grade B falling midway.

For a total mark range of 0 – 200, the following gives an indication of the cut-off scores:

Grade	Band	Mark Range
A	1	170-200
A	2	140-169
B	3	130-139
B	4	120-129
C	5	110-119
C	6	100-109
D	7	90-99
NA	8	80-89
NA	9	0-79

These cut-off scores may be lowered if the Question Paper is deemed to be more demanding or raised if the Question Paper is deemed to be less demanding than intended.

Worked example

- In a centre's own Prelim, the candidate scores 61 out of a maximum 100 marks.
- It is the centre's view is that the prelim is slightly less demanding than the national standard set by SQA Question Papers.
- The centre estimates that the candidate should gain 70 out of a maximum 100 marks for the Project.
- Combining both components (ie 61/100 + 70/100), gives a total mark of 131 out of a maximum 200 marks.
- Using the mark range given above, this should result in the centre submitting a **Band 3** estimate.
- However, as the centre feels that their own prelim is slightly less demanding than the national standard set by SQA, the centre feels a more realistic estimate would be a **Band 4**.

[C023/SQP297]

Building Construction

Time: 2 hours

Higher

Specimen Question Paper
(for examinations in and after 2007)

NATIONAL QUALIFICATIONS

100 marks are allocated to this paper**.**

Answer **all** questions in Section A (40 marks).

Answer any **two** questions from Section B (30 marks each).

Worksheets are provided for use with questions 10(*b*), 11(*a*)(i) and 11(*c*). Hand these in with your answer book.

SCOTTISH QUALIFICATIONS AUTHORITY

SECTION A

Attempt all the questions in this Section (total 40 marks)

Marks

1. Sketch **one** common method of forming a temporary road into a construction site where the existing ground conditions are known to be soft. **2**

2. Briefly describe how the following construction materials should be stored on a site.

- Facing bricks
- Trussed rafters **4**

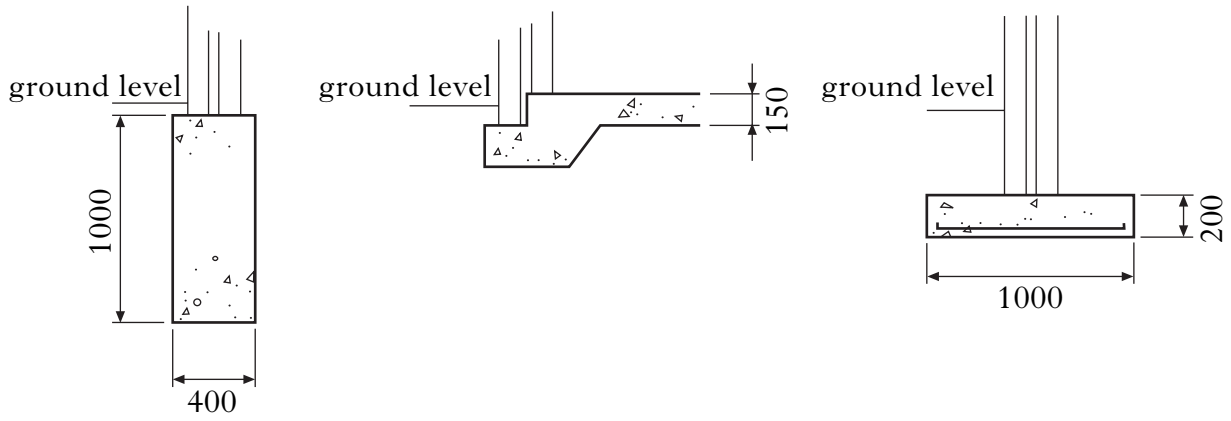
3. A developer proposes to construct ten new detached houses on a greenfield site.

(*a*) Briefly describe **two** methods of undertaking ground investigation for the site. **4**

(*b*) List **four** items of information from a site investigation report which would be of interest to the engineer who will design the foundations. **4**

4. State the name given to each foundation type shown at (i), (ii) and (iii) below and describe **one** situation where **each** may be used. **6**

Dimensions in mm.

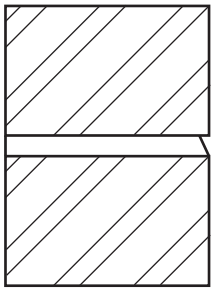


(i) (ii) (iii)

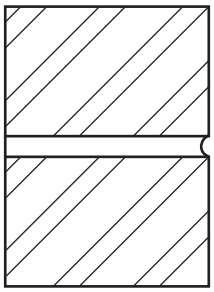
Marks

5. A development of five houses is to be constructed using traditional cavity wall construction with an outer leaf basecourse of clay facing brick.

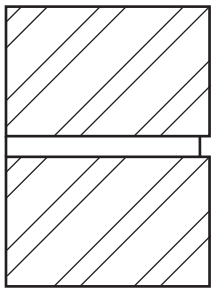
(*a*) State the name of the following mortar pointing/jointing finishes shown at (i), (ii) and (iii) below. **3**



(i)



(ii)



(iii)

(*b*) State a potential risk of the jointing finish shown at (iii) above. **1**

6. A smooth surface finish is required for the plasterboard ceilings of a dwelling house ready to receive an emulsion paint finish.

Briefly describe with the aid of annotated sketches, **two** ways in which this smooth surface finish may be achieved. **4**

Marks

7. Figure Q7 shows a vertical cross section through a concrete precast suspended ground floor of a dwelling house.

State the name of the component parts numbered 1 to 8 and explain the purpose of component number 8. **6**

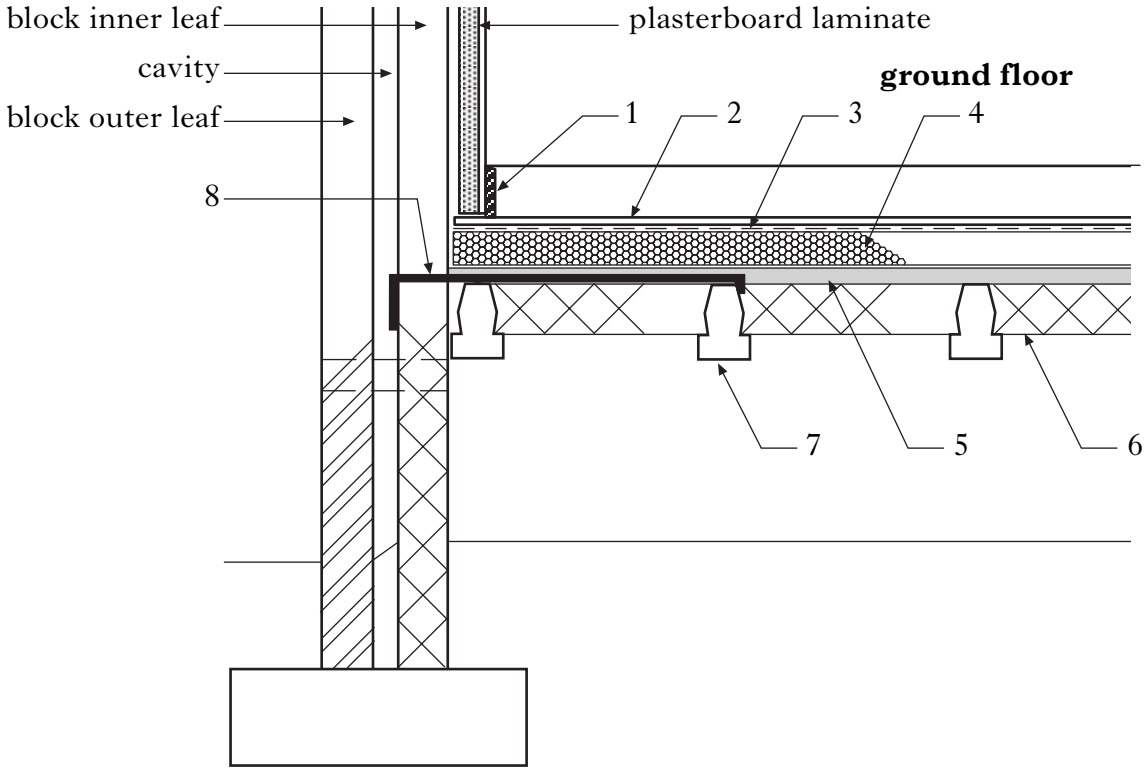


Figure Q7

8. Figure Q8 shows a cross section through a stair within a split level house.

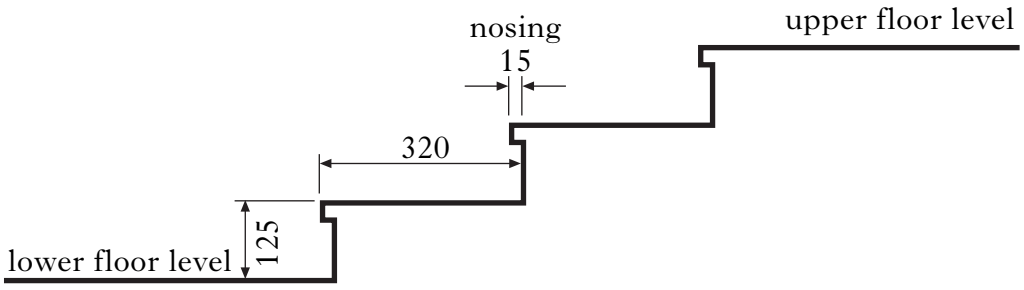


Figure Q8

Using the information given, state whether or not the stair complies with the recommendations made in current standards, giving the reasons for your answer. **6**

(40)

SECTION B

Attempt any TWO questions in this Section (total 60 marks)

Marks

9. Five new detached houses are to be constructed on a sloping site.

(*a*) The main routes to gathering information for a site investigation are:

- the desk study
- the walk-over survey
- direct investigation.

Describe the essential features of the desk study and the walk-over survey. **14**

(*b*) The foundations will be 200 mm thick concrete strip foundations.

(i) State **two** factors which will control the width of the foundation. **2**

(ii) Figure Q9(*b*)(ii) below shows a longitudinal section through a step in the foundation.

Sketch and dimension the detail in your answer book to illustrate compliance with current standards. **4**

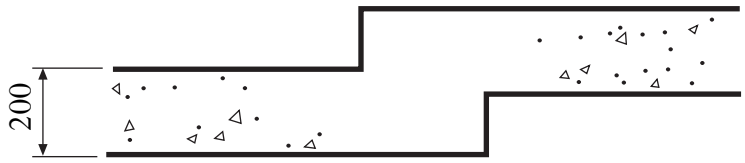


Figure Q9(*b*)(ii)

(*c*) The contractor intends to excavate the foundation trenches for all five houses before pouring the foundation concrete.

Briefly describe **two** methods of transporting the ready-mix concrete for the foundation from the mixing plant to the pour location on site where access is restricted to one side only. **4**

(*d*) A new sewer passing below a roadway will require excavation to a depth in excess of 2 metres at some points along its length.

(i) Briefly explain why it would be important to carry out a safety "risk assessment" prior to commencing a trench excavation and describe the factors which would be taken into consideration. **3**

(ii) Briefly describe, with the aid of an annotated sketch, **one** method of supporting the trench during the excavation and of placing the new sewer. **3**

(30)

Marks

10. A development of new detached dwelling houses is proposed on the edge of a village.

(*a*) *In-situ* concrete ground-supported floor slabs are proposed for the houses.

(i) Briefly describe how the contractor would reinforce the floor slab and explain why this reinforcement may be necessary. **3**

(ii) Briefly describe how the contractor may undertake the following processes related to the construction of the *in-situ* concrete floor slabs.

- compaction of the concrete
- finishing the slab surface
- curing the concrete

Briefly explain why each process is important to the quality of the finished concrete. **12**

(*b*) **Worksheet Q10(*b*)** shows an incomplete detail drawing for a foundation and *in-situ* concrete ground floor to a dwelling house.

On the **Worksheet**, complete the drawing in proportion to show the following:

- support for the concrete slab
- how moisture is prevented from entering the building
- finished ground level
- insulation
- floor finish
- two critical dimensions. **9**

(*c*) The local planning authority has approved the use of natural slate as the roof finish.

(i) State the advantages of using this roof finish. **2**

(ii) Explain, with the aid of an annotated sketch, how this slate is applied and fixed to the structure in traditional Scottish practice. **4**

(30)

Marks

11. (*a*) (i) **Worksheet Q11(*a*)(i)** shows an incomplete detail drawing of an external door jamb.

On the **Worksheet**, complete the drawing in proportion with notes to ensure compliance with current standards and traditional Scottish practice. All surrounding construction and finishes to be shown. **6**

(ii) Briefly describe **one** method of applying the internal wall finish to the blockwork structure. **2**

(*b*) Briefly describe, with the aid of annotated sketches, how any **two** of the following finishes would be applied:

- external render with a dry dash finish applied to dense blockwork
- ceramic wall tiles to bathroom applied to plasterboard
- built-up felt finish to flat roof.

Include a brief description of any preparation which may be required. **8**

(*c*) **Worksheet Q11(*c*)** shows an architect's detail of a new timber private stair which rises to an attic conversion comprising two bedrooms and a bathroom.

(i) On **Worksheet Q11(*c*)**, state the names of the component parts of the stair lettered A to F. **6**

(ii) State on the **Worksheet**, the minimum permitted dimension for each of the following:

- height of the handrail
- going at points **X** and **Y**
- width of stair. **3**

(iii) Using the dimensions given on the **Worksheet**, calculate the rise, going and pitch of the stair and state whether or not the stair complies with the recommendations given in current standards. **5**

(30)

[*END OF SPECIMEN QUESTION PAPER*]

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FOR OFFICIAL USE

[C023/SQP297]

Building Construction

Time: 2 hours

Higher

Worksheets for Questions 10(*b*), 11(*a*)(i) and 11(*c*)

Specimen Question Paper

(for examinations in and after 2007)

NATIONAL QUALIFICATIONS

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

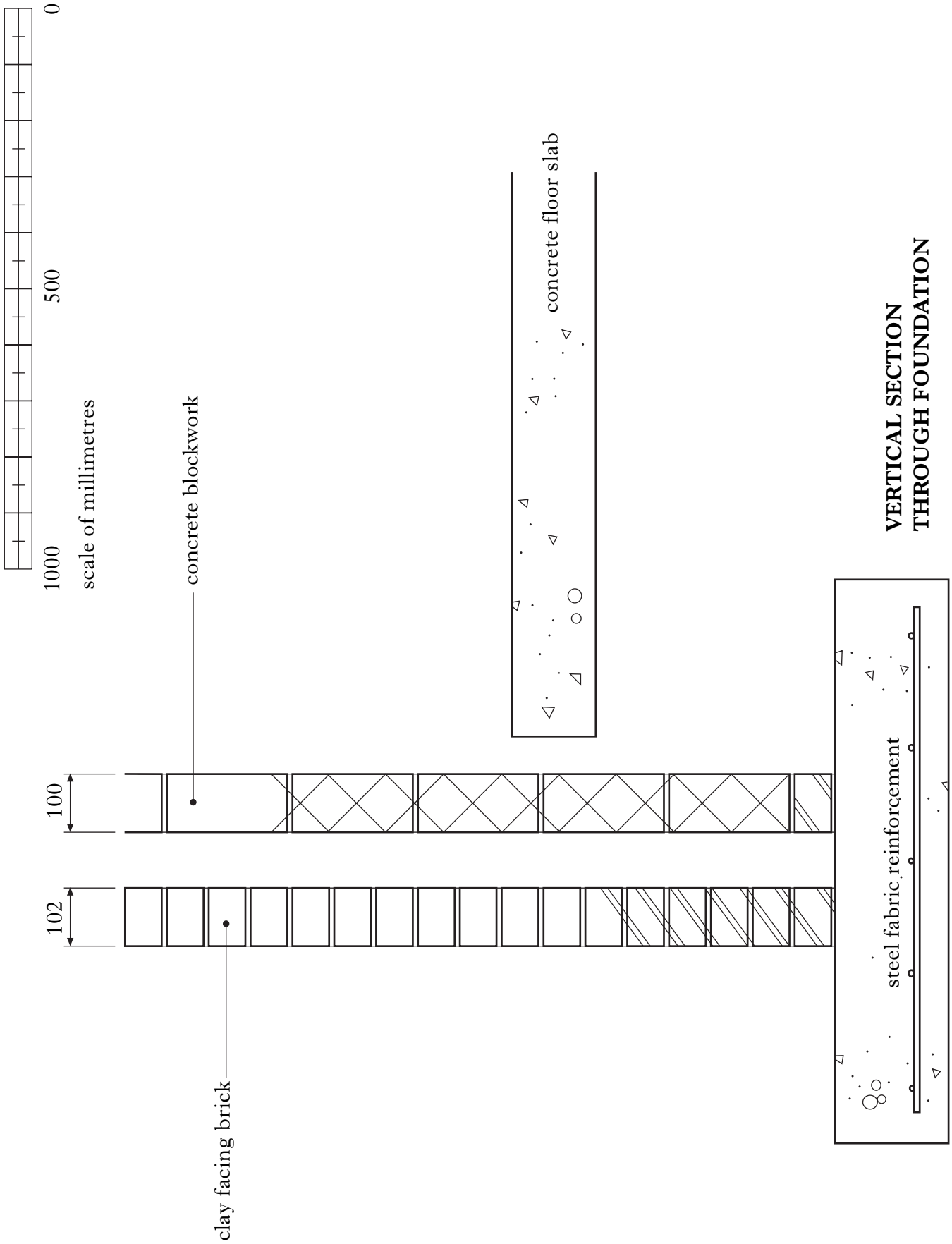
Scottish candidate number

Number of seat

To be inserted inside the front cover of the candidate's answer book and returned with it.

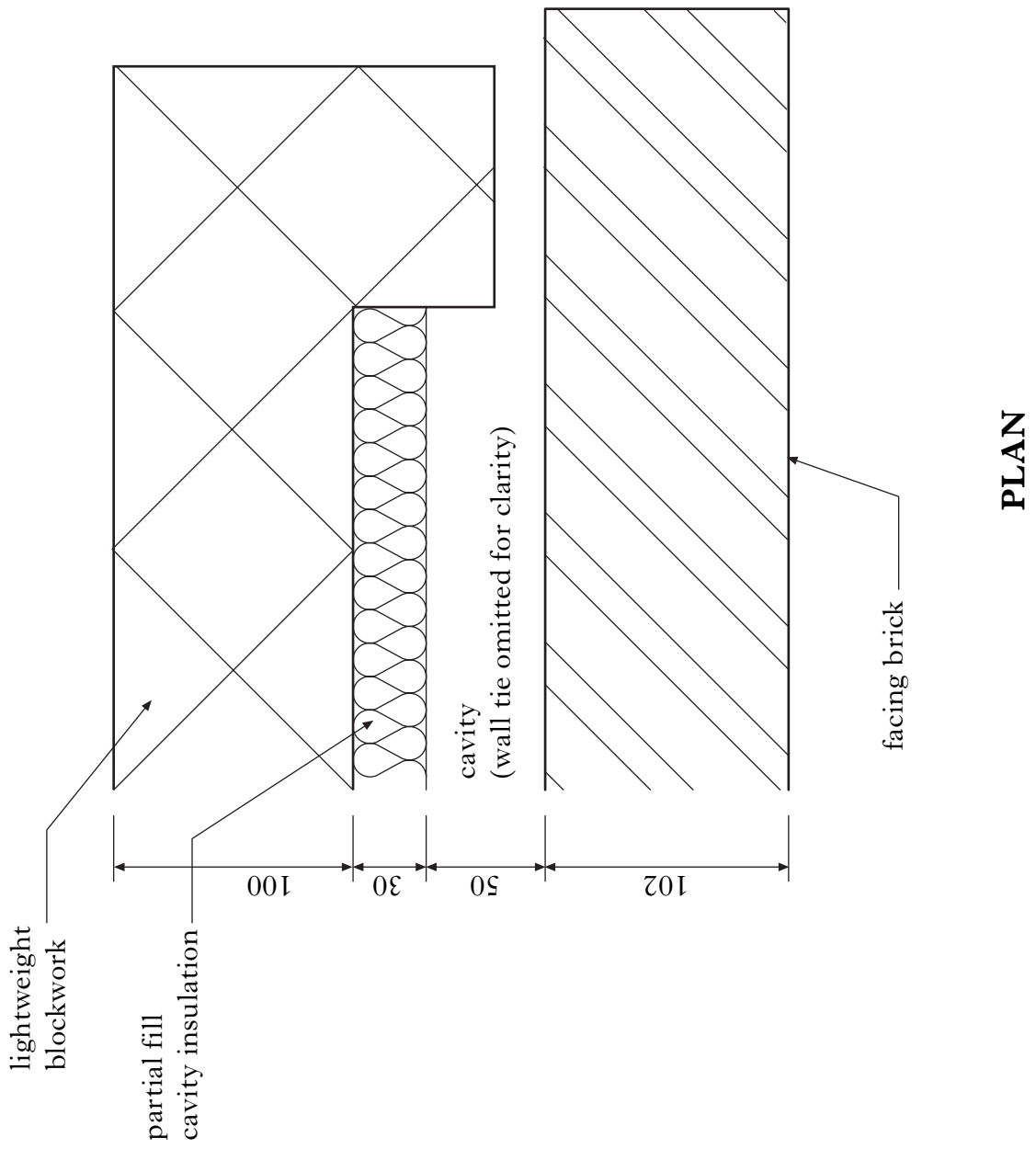
SCOTTISH QUALIFICATIONS AUTHORITY

WORKSHEET Q10(*b*)



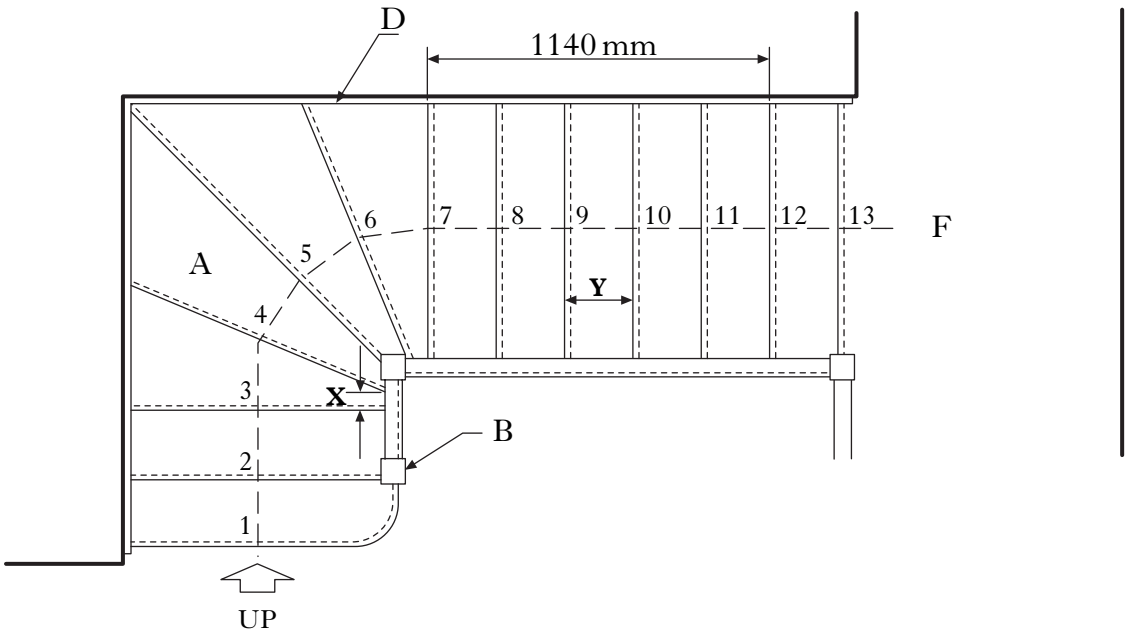
WORKSHEET Q11(*a*)(i)

(dimensions are in millimetres)



PLAN

WORKSHEET Q11(*c*)



PLAN

Question 11(*c*)(i)

A .....

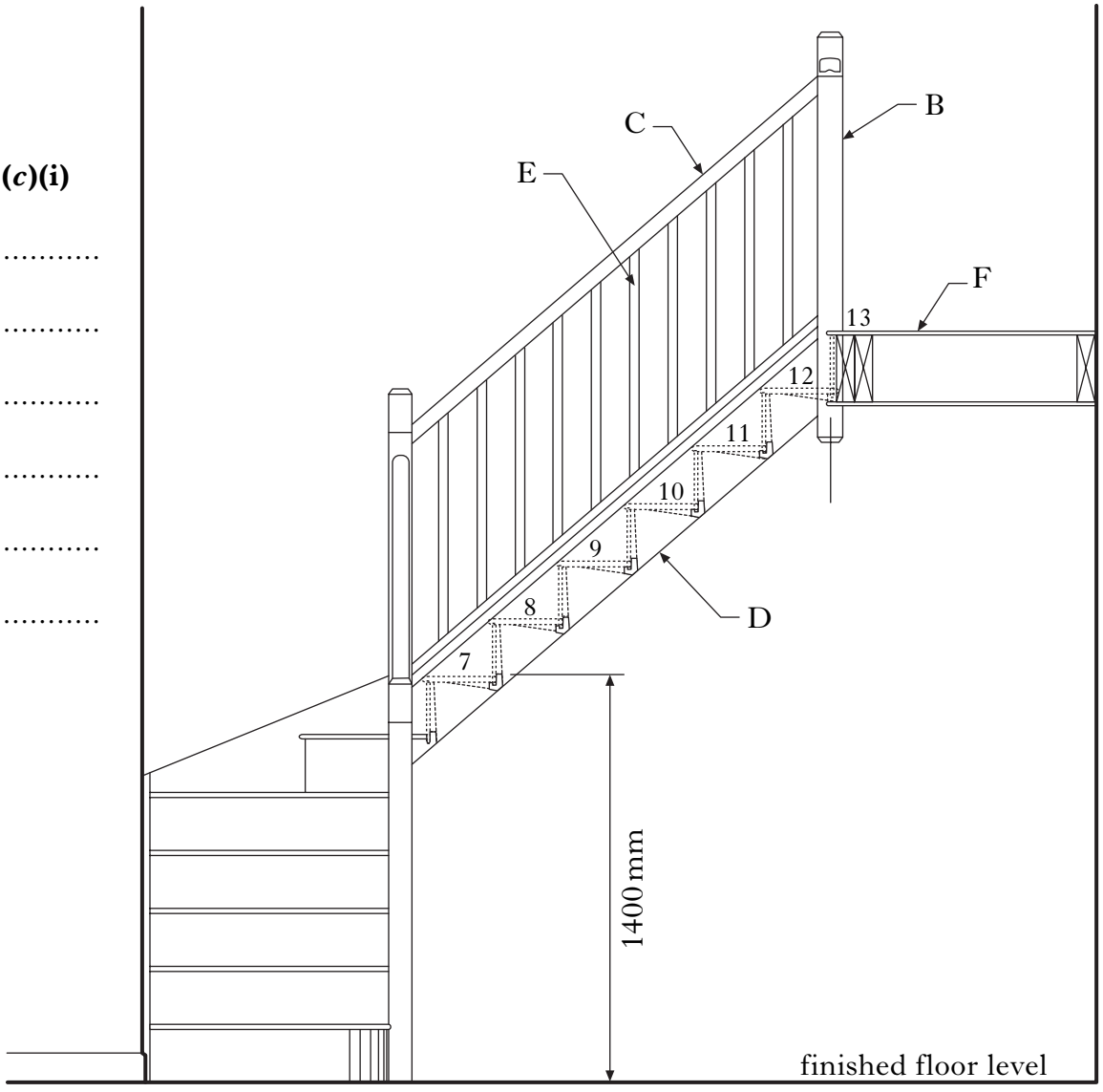
B .....

C .....

D .....

E .....

F .....



ELEVATION

[*END OF SPECIMEN WORKSHEETS*]

[C023/SQP297]

Building Construction
Higher
Specimen Marking Instructions
(for examinations in and after 2007)

NATIONAL QUALIFICATIONS

SCOTTISH QUALIFICATIONS AUTHORITY

SECTION A

Marks

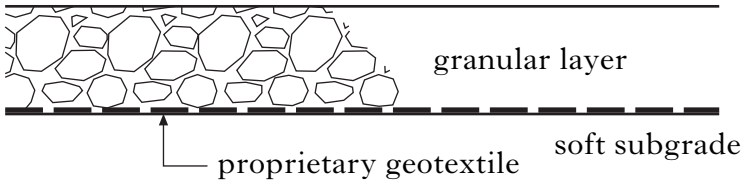
1. *Sketch **one** common method of forming a temporary road into a construction site where the existing ground conditions are known to be soft.*

Select **one** from:

Lay proprietary geotextile membrane followed by Type 1 or 2 hardcore from a quarry and compact it in layers to provide a suitable temporary road. (see sketch below)

OR

Contractor may decide to partly construct the permanent roads on the site but without any kerbs or surface finish.



(2)

2. *Briefly describe how the following construction materials should be stored on a site.*

- *Facing bricks*
- *Trussed rafters*

Facing bricks

Must be stored on a firm, level, well drained base, off the ground and must be protected with polythene to prevent them becoming wet or splashed by vehicles. **2**

Trussed rafters

Must be stored either horizontally or vertically off the ground, fully supported by battens below all joints to avoid damage to the joints by distortion. Must be protected from rain with a waterproof sheet secured all round. **2**

(4)

Marks

3. *A developer proposes to construct ten new detached houses on a greenfield site.*

(*a*) *Briefly describe **two** methods of undertaking ground investigation for the site.*

Trial pits dug by mechanical excavator to a depth of approximately 3 metres to allow visual inspection of strata and removal of samples for laboratory analysis. *In-situ* testing may be carried out at various levels. **2**

150 mm or 200 mm diameter bore holes are made using light percussion drilling equipment. Rig towed by 4-wheel drive vehicle and operated by a two-man crew. The borehole is progressed by dropping a hollow tube into the hole, so that the soil becomes lodged in the tube. Contents are then lifted to the surface. *In-situ* and laboratory testing may be carried out. **2**

(*b*) *List **four** items of information from a site investigation report which would be of interest to the engineer who will design the foundations.*

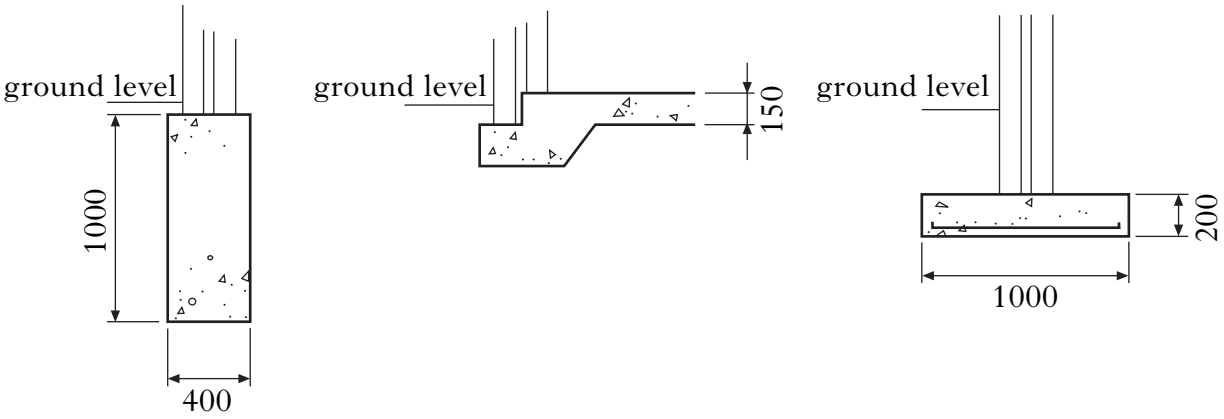
Evidence of water in the ground **1**
Type of soil samples **1**
Depth of soil strata **1**
Results from *in-situ* tests **1**
Results from laboratory tests such as chemicals in the soil **1**

Any **four** and the answer may include other items not listed above. **(8)**

Marks

4. *State the name given to each foundation type shown at (i), (ii) and (iii) below and describe* ***one*** *situation where* ***each*** *may be used.*

Dimensions in mm.



(i) (ii) (iii)

(i) **Deep strip foundation** **1**

Used in sub-soils, such as shrinkable clay, to counteract the variable soil conditions at different seasons. Also could be used to take the foundation down through weak soil to a firm strata. **1**

(ii) **Raft foundation** **1**

Lightweight structures on ground of relatively poor strength. Used in areas of filled ground with mixed/poor bearing capacity. **1**

(iii) **Wide strip foundation** **1**

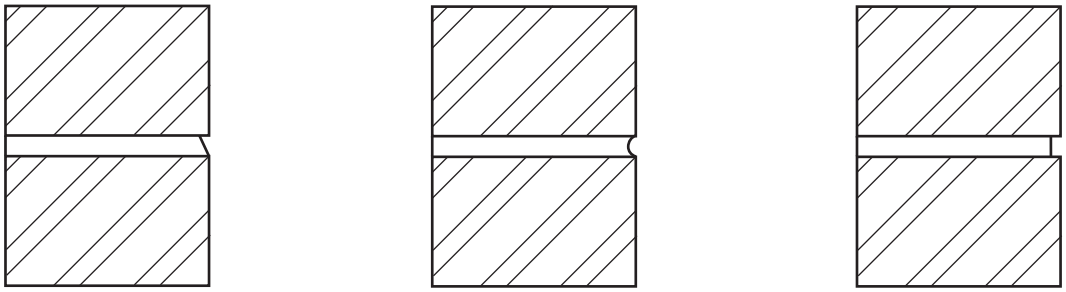
Used in sub-soils with low bearing capacity such as sand. **1**

(6)

Marks

5. *A development of five houses is to be constructed using traditional cavity wall construction with an outer leaf basecourse of clay facing brick.*

(*a*) *State the name of the following mortar pointing/jointing finishes shown at (i), (ii) and (iii) below.*



(i) (ii) (iii)

(i) Weather struck **1**

(ii) Keyed or bucket handle **1**

(iii) Recessed **1**

(*b*) *State a potential risk of the jointing finish shown at (iii) above.*

Risk of frost attack to the brickwork because the small ledge (recess) may permit the brick to become saturated and liable to freezing.

May also be greater risk of water penetration through joint to the cavity. **1**

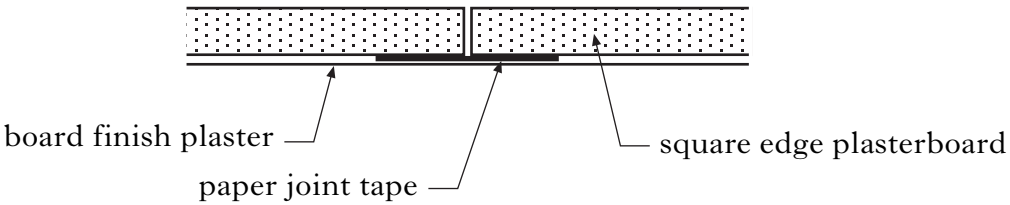
(4)

Marks

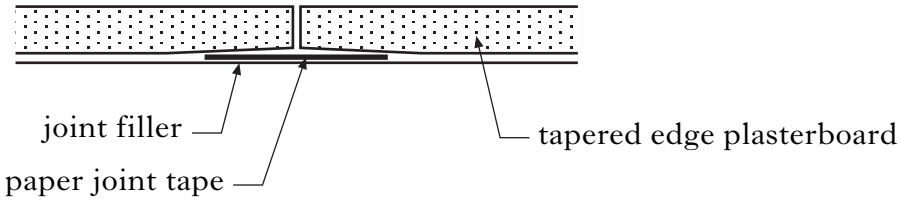
6. *A smooth surface finish is required for the plasterboard ceilings of a dwelling house ready to receive an emulsion paint finish.*

Briefly describe, with the aid of annotated sketches, ***two*** *ways in which this smooth surface finish may be achieved.*

1. Fix square edge plasterboard to the ceiling with the grey face down and apply a paper tape over all joints in the board. Apply a proprietary board finish plaster 2 mm thick. (see sketch below) **2**



2. Fix plasterboard having a tapered edge to the ceiling with cream face down. Tape and fill all joints to a smooth surface finish. **2**



(4)

Marks

7. *Figure Q7 shows a vertical cross section through a concrete precast suspended ground floor of a dwelling house.*

State the name of the component parts numbered 1 to 8 and explain the purpose of component number 8.

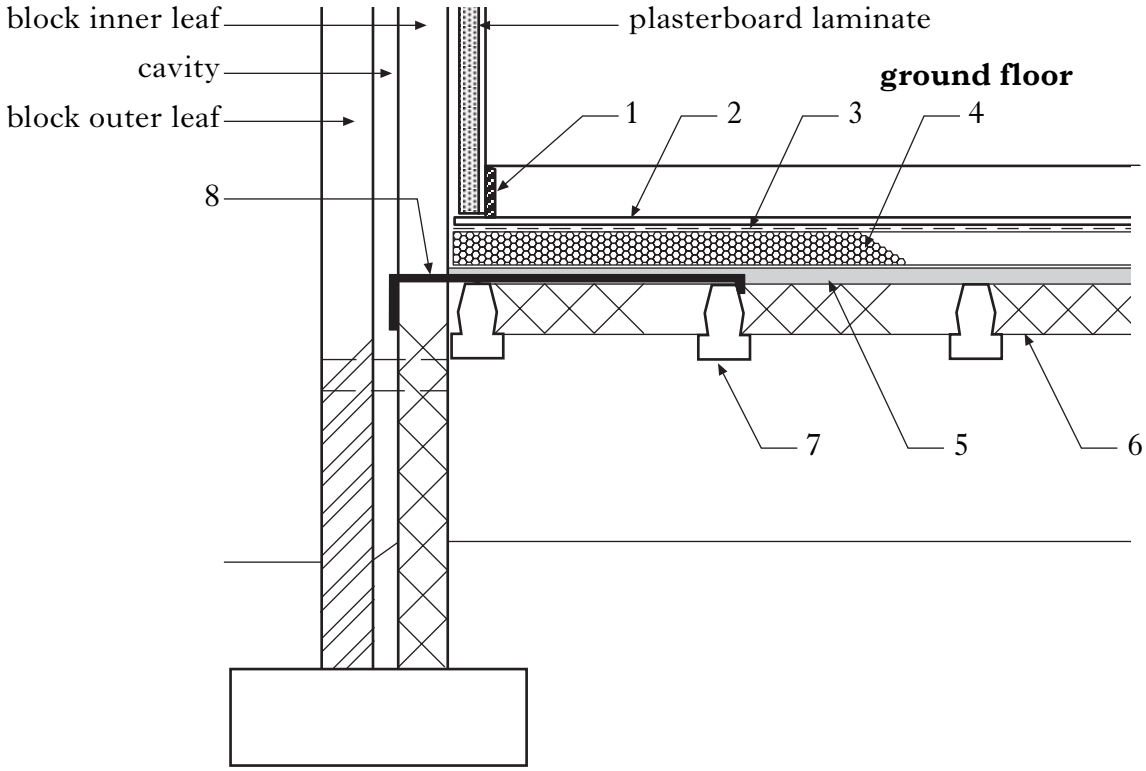


Figure Q7

Component Part No	Name	
1	Skirting	½
2	Tongued & Grooved Chipboard flooring (other material acceptable)	½
3	Vapour control layer—polythene sheet	½
4	Insulation	½
5	Sand/cement levelling screed	½
6	Lightweight concrete blocks	½
7	Precast concrete beams	½
8	Horizontal restraint strap	½

These straps, manufactured from galvanised steel or stainless steel, provide the floor with horizontal lateral restraint to an external wall when the concrete beams run parallel with the wall.

2

(6)

Marks

8. *Figure Q8 shows a cross section through a stair within a split level house.*

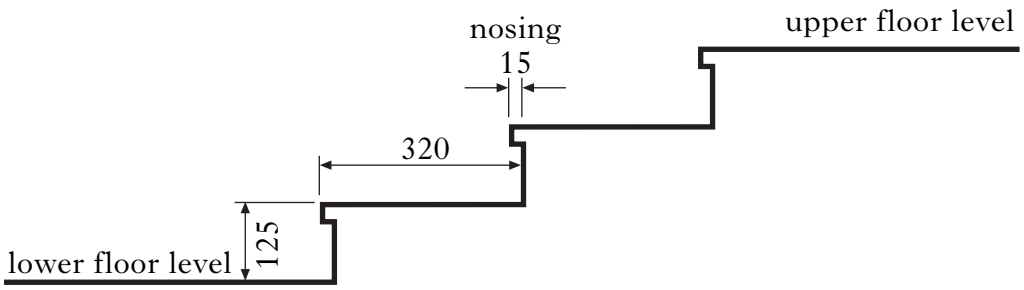


Figure Q8

Using the information given, state whether or not the stair complies with the recommendations made in current standards, giving the reasons for your answer.

Rise	Minimum rise—100 mm	Rise OK	**1**
	Maximum rise—220 mm	Rise OK	**1**
Going	Minimum going—225 mm	Going: 320–15 = **305 mm** Going OK	**1**
Number of rises	Minimum 3	Therefore OK	**1**

Aggregate of going and twice the rise should be at least 550 mm and not more than 700 mm.

(2 × 125) + 305 = 555 mm Therefore OK **2**

(6)

Stair therefore complies with the recommendations given in current standards.

SECTION B

Marks

9. *Five new detached houses are to be constructed on a sloping site.*

(*a*) *The main routes to gathering information for a site investigation are:*

- *the desk study*
- *the walk-over survey*
- *direct investigation.*

Describe the essential features of the desk study and the walk-over survey.

The desk study

The essential feature is that it brings together for examination all available documents that bear on the character and history of the site. It seeks to answer two questions.

What is the nature and condition of the ground below the proposed construction?

What are the implications for the design of the structure and its foundation?

The desk study should consider:

- planning history
- existing services
- location of the site on maps
- location of site boundaries
- identification of contours
- check for records of changes in use of the site
- check for rights of way
- implications of the potential for flooding
- check for indications of existing and earlier constructions.

Checks should be made with map libraries, aerial photographs and geological maps. The possibility of mining or quarrying activity may also be identified from records.

Information from the desk study is now used to focus on the next stage—the walk-over survey. **7**

The walk-over survey

The walk-over survey provides information that cannot be obtained from the study of documents alone. It enables first-hand examination of the site and provides an opportunity to obtain valuable local information by directly questioning local sources.

The first task is a systematic search of the site to confirm and add to the site plan drawn following the desk study. Points raised by the desk study should be related to observations made on site and any conflicts noted.

Notes should be made of a variety of features such as:

- indications of water features, indications of flooding
- evidence suggesting filled ground or tipped rubbish
- indications that subsoil type changes with location
- local depressions in the ground, etc.

Existing buildings or other structures near the site may also be examined.

An important part of the walk-over survey is the opportunity to seek information from local sources, eg:

- local building control officers
- public Utilities
- local builders, etc. **7**

Marks

(*b*) *The foundations will be 200 mm thick concrete strip foundations.*

(i) *State **two** factors which will control the width of the foundation.*

Factor 1 — Load being transmitted **1**

Factor 2 — Bearing capacity of subsoil under proposed foundation **1**

(ii) *Figure Q9(b)(ii) below shows a longitudinal section through a step in the foundation.*

Sketch and dimension the detail in your answer book to illustrate compliance with current standards.

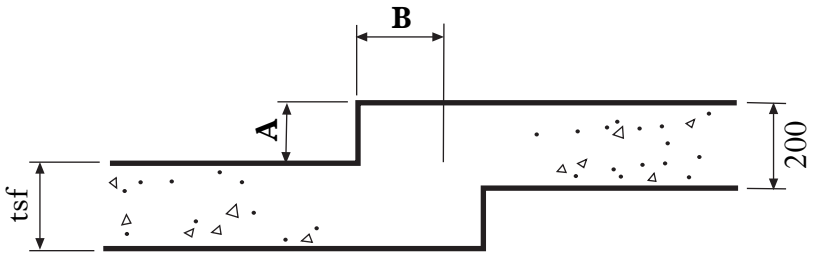


Figure Q9(*b*)(ii)

A—not greater than the thickness of the foundation—
tsf (200 mm here) **2**

B— equal to tsf (2 × A) or 300 mm whichever is the greatest **2**

(*c*) *The contractor intends to excavate the foundation trenches for all five houses before pouring the foundation concrete.*

*Briefly describe **two** methods of transporting the ready-mix concrete for the foundation from the mixing plant to the pour location on site where access is restricted to one side only.*

Briefly describe any **two** from:

truck mixer—the majority of ready-mix concrete is batched and mixed in a truck mixer
dumper trucks
concrete crane skip
concrete pump
chutes and conveyors. **4**

Marks

(*d*) *A new sewer passing below a roadway will require excavation to a depth in excess of 2 metres at some points along its length.*

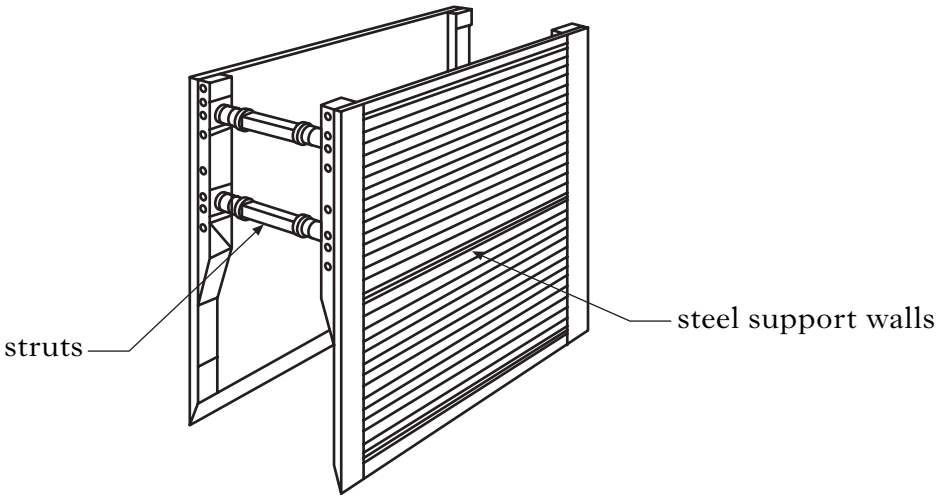
(i) *Briefly explain why it would be important to carry out a safety "risk assessment" prior to commencing a trench excavation and describe the factors which would be taken into consideration.*

Many accidents have occurred as a result of sudden collapse of the sides of a trench excavation where people are working at the base of the excavation. The risk of collapse must be assessed by taking account of the soil types, weather, depth of excavation and means of support, etc. **3**

(ii) *Briefly describe, with the aid of an annotated sketch,* ***one*** *method of supporting the trench during the excavation and of placing the new sewer.*

Candidates' may choose either: Proprietary shoring systems lifted into place by mechanical plant **or** traditional timbering of the trench. The sketch below indicates a proprietary box system which is modular and has strutted support. It acts as a safety box to protect workmen. Boxes of this type can be extended in width and height. **3**

(30)



Marks

10. *A development of new detached dwelling houses is proposed on the edge of a village.*

(*a*) *In-situ concrete ground-supported floor slabs are proposed for the houses.*

(i) *Briefly describe how the contractor would reinforce the floor slab and explain why this reinforcement may be necessary.*

The slab would be reinforced with steel fabric in the top of the slab. This is to provide crack control which may occur as a result of shrinkage and temperature movements in the early life of the slab. The steel fabric will also increase the load bearing capacity of the slab. **3**

(ii) *Briefly describe how the contractor may undertake the following processes related to the construction of the in-situ concrete floor slabs.*

- *compaction of the concrete*
- *finishing the slab surface*
- *curing the concrete*

Briefly explain why each process is important to the quality of the finished concrete.

Compaction of the concrete

May be undertaken by using either a poker vibrator or a beam vibrator. The poker vibrator (one of the most common) is inserted into the concrete during pouring/placing operations.

The beam vibrator is designed for concrete slabs. Slabs usually have to have a flat top surface and the necessary compaction and shaping can be done in one operation. **2**

The process of compaction is important because concrete which has been placed contains entrapped air in the shape of voids. If air voids are not removed by compaction their presence will:

- reduce the strength of the concrete
- increase concrete permeability
- reduce bond between concrete and reinforcement
- result in visual blemishes on the finished concrete. **2**

Finishing the slab surface

The beam vibrator may provide an acceptable finish for the concrete. The slab may also be finished with a steel trowel or a power float finish. **2**

Finishing is important to provide a satisfactory level floor for the purpose. A smooth surface can be easily cleaned, have good resistance to abrasion and have low maintenance. The type of finish will depend on the internal floor finishes. **2**

Marks

Curing the concrete

Any of the following methods may be used to prevent premature loss of moisture.

- Covering concrete in damp Hessian
- Covering concrete in plastic sheeting
- Sprayed-on curing membranes **2**

Concrete must be protected during curing from the harmful effects of dry air, hot sunshine, drying winds and frost. The main reasons for curing are to assist strength development and improve the durability of the concrete. Premature loss of water must be prevented for the full benefits of cement hydration on the properties of hardened concrete to be realised. **2**

(*b*) ***Worksheet Q10(b)*** *shows an incomplete detail drawing for a foundation and in-situ concrete ground floor to a dwelling house.*

On the ***Worksheet****, complete the drawing in proportion to show the following:*

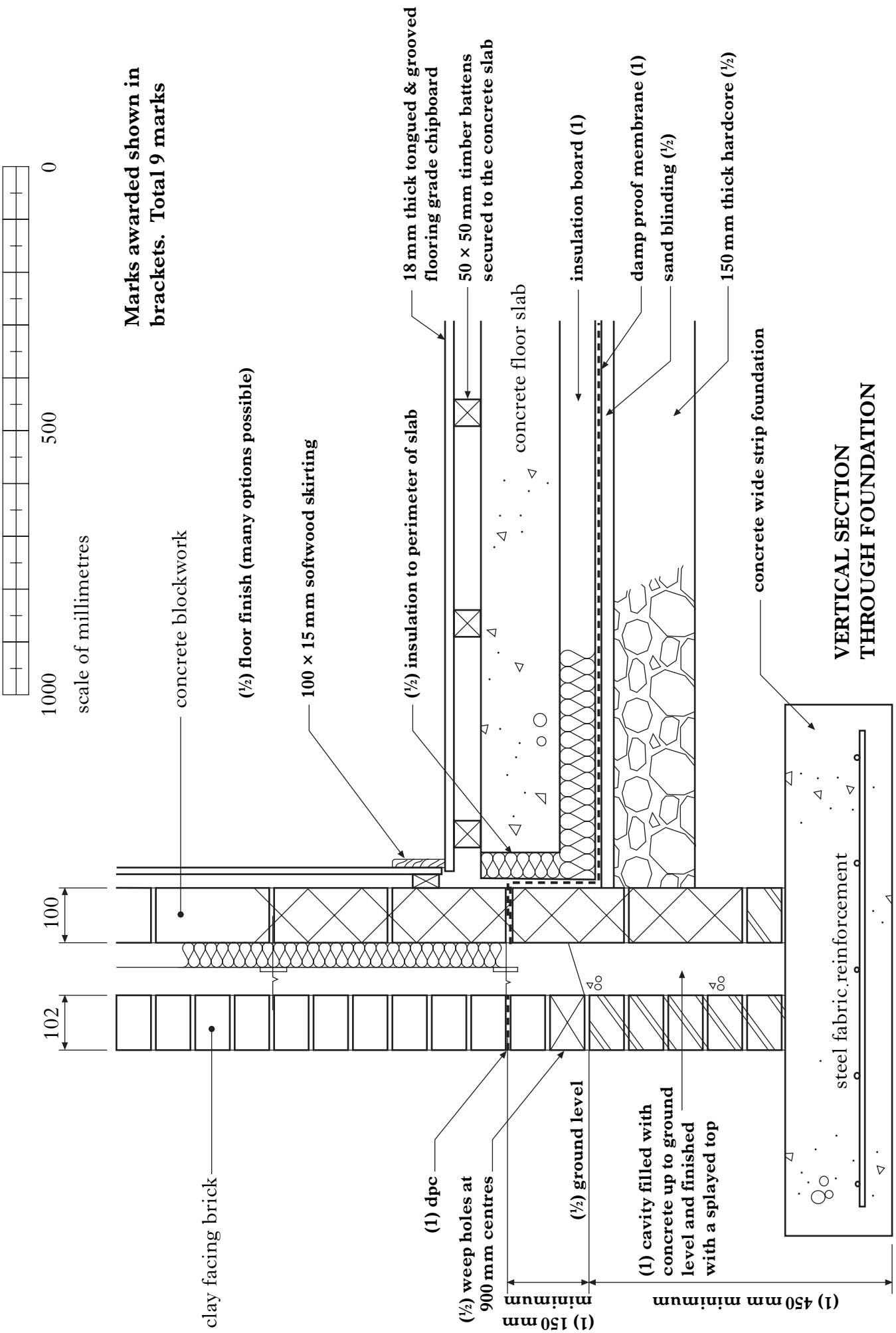
- *support for the concrete slab*
- *how moisture is prevented from entering the building*
- *finished ground level*
- *insulation*
- *floor finish*
- *two critical dimensions.*

The attached **Worksheet Q10(*b*)** indicates one solution.

Other solutions will be acceptable provided they comply with current standards.

Marks should be awarded as follows:

- an indication where ground level should be **½**
- critical dimension showing depth of foundation below ground level **1**
- cavity filled with concrete up to ground level **1**
- weep holes in outer leaf **½**
- damp proof course in the wall at the correct location **1**
- critical dimension for location of dpc (150 mm min above ground level) **1**
- 150 mm thick hardcover **½**
- blinding **½**
- damp proof membrane **1**
- insulation in floor **1**
- insulation at perimeter of slab **½**
- floor finish. **½**


VERTICAL SECTION
THROUGH FOUNDATION
Marks awarded shown in brackets. Total 9 marks
0
500
1000
scale of millimetres
concrete blockwork
(½) floor finish (many options possible)
100 × 15 mm softwood skirting
(½) insulation to perimeter of slab
18 mm thick tongued & grooved flooring grade chipboard
50 × 50 mm timber battens secured to the concrete slab
concrete floor slab
insulation board (1)
damp proof membrane (1)
sand blinding (½)
150 mm thick hardcore (½)
concrete wide strip foundation
steel fabric reinforcement
100
102
clay facing brick
(1) dpc
(½) weep holes at 900 mm centres
(½) ground level
(1) cavity filled with concrete up to ground level and finished with a splayed top
(1) 150 mm minimum
(1) 450 mm minimum

Marks

(*c*) *The local planning authority has approved the use of natural slate as the roof finish.*

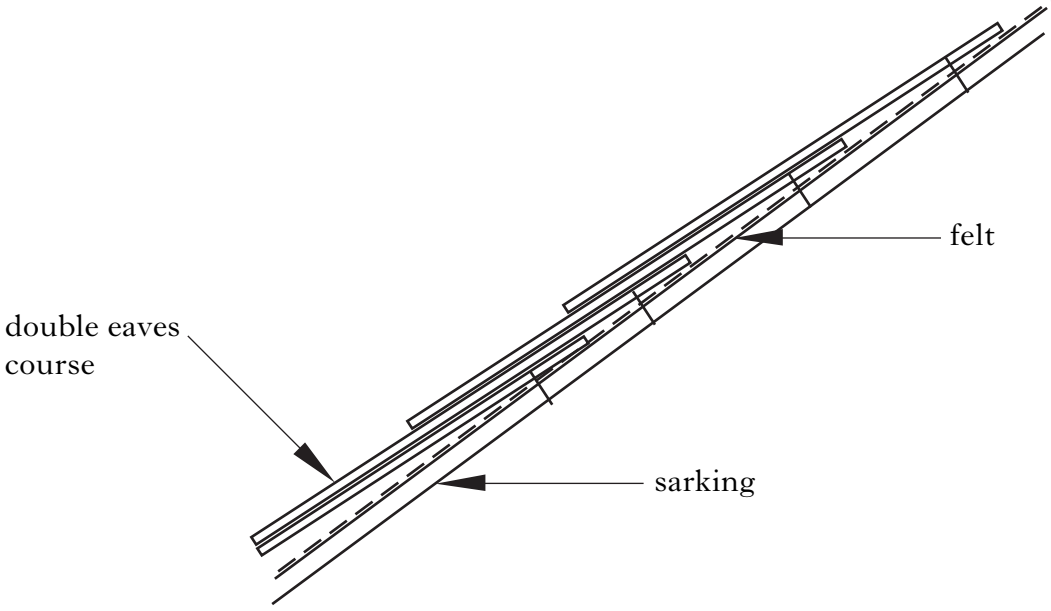
(i) *State the advantages of using this roof finish.*

Slate is a rock and is very durable
Slate has low water absorption
Resistance to frost attack
Resistance to fire
Mechanical resistance
Aesthetically pleasing (any four 4 × ½ = 2) **2**

(ii) *Explain, with the aid of an annotated sketch, how this slate is applied and fixed to the structure in traditional Scottish practice.*

Sort slates into batches of the same length, size and thickness
Hole slates with single hole in the head
Lay underlay felt
Lay under eaves course of small slates upside down
Continue to slate the roof ensuring a double lap. Allow for larger slates at the eaves diminishing to smaller slates at the ridge
Single nail all slates in the head through the felt and sarking boards. **4**

(30)



Marks

11. (*a*) (i) ***Worksheet Q11(a)(i)*** *shows an incomplete detail drawing of an external door jamb.*

On the ***Worksheet****, complete the drawing in proportion with notes to ensure compliance with current standards and traditional Scottish practice. All surrounding construction and finishes to be shown.*

The attached **Worksheet Q11(*a*)(i)** indicates one solution.

Marks are awarded as follows:

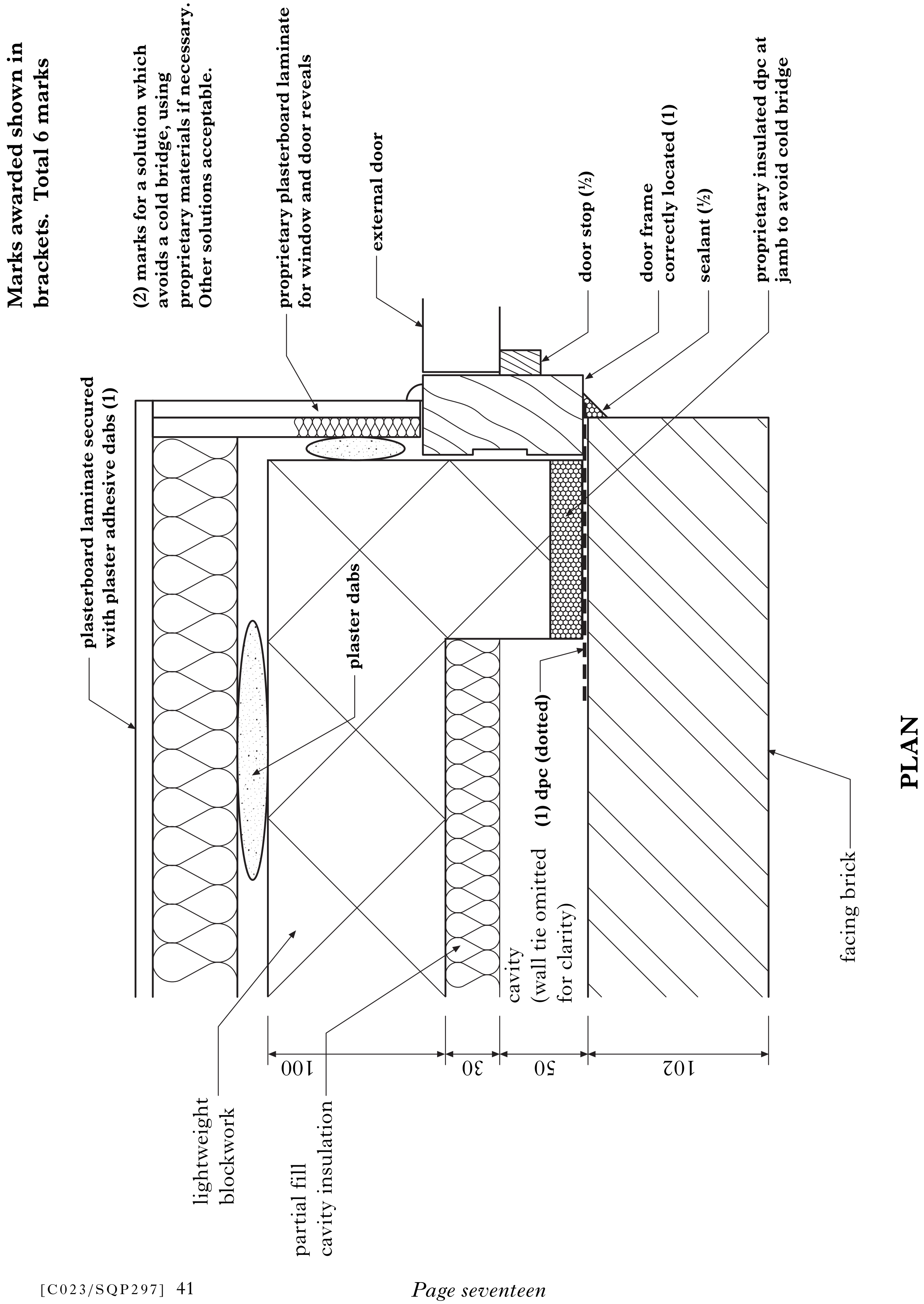
- damp proof course correctly located **1**
- door frame correctly located **1**
- door stop shown **½**
- door frame sealant shown **½**
- internal wall finish shown **1**
- a solution which avoids a "cold bridge". **2**

(ii) *Briefly describe* ***one*** *method of applying the internal wall finish to the blockwork structure.*

The internal wall finish may be plasterboard laminate to provide additional insulation to the wall. Plasterboard laminate may be fixed to the background with plaster adhesive dabs to bond boards directly to the blockwork background. Plasterboard laminates may require some secondary mechanical fixing. **2**

WORKSHEET Q11(*a*)(i)

(dimensions are in millimetres)



Marks

(*b*) *Briefly describe, with the aid of annotated sketches, how any **two** of the following finishes would be applied:*

- *external render with a dry dash finish applied to dense blockwork*
- *ceramic wall tiles to bathroom applied to plasterboard*
- *built-up felt finish to flat roof.*

Include a brief description of any preparation which may be required.

External render with a dry dash finish

The sequence should include most of the following points.

- Preparation of the background by brushing down with a hard broom to remove dust and loose particles.
- Immediately before applying the undercoat, check background for excessive suction. Dampen but do not soak backgrounds as appropriate.
- Apply the undercoat mix by laying on with a trowel to a thickness of between 8 mm and 10 mm, trowel with pressure to remove air. Key the undercoat with a comb to scratch the surface. Cure the undercoat before applying top coat.
- Apply butter coat of rendering to a uniform thickness of 8 mm and while it is still plastic throw washed aggregate onto the surface to a uniform dense coverage. Immediately tamp the aggregate lightly into the butter coat to ensure a good bond is obtained. **4**

Ceramic wall tiles to bathroom

The sequence should include most of the following points.

- Establish a vertical centre line on which either a tile centre or joint will reside.
- Establish a level line with timber straight edge to position starting course and ensure rows of tiles are truly horizontal.
- Apply adhesive to the wall 3 mm thick and comb through with a notched trowel.
- Press dry tiles into the adhesive with a twisting and sliding action.
- Grout tiles with a waterproof grout. **4**

Built-up felt finish to flat roof (other solutions will be acceptable)

The sequence should include most of the following points.

- Prepare deck and lay perforated roofing felt and leave unbonded
- Lay vapour barrier bonded in hot bitumen and creating a partial bond with the deck and turned back 150 mm over the insulation.
- Lay rigid insulation boards bonded in hot bitumen.
- Lay two layer built-up felt roof, the under layer bonded in hot bitumen to the insulation followed by the cap sheet also bedded in hot bitumen.
- Apply white coloured chippings bedded in hot bitumen to achieve a fire rating and as a solar reflective treatment. **4**

Marks

(*c*) ***Worksheet Q11(c)*** *shows an architect's detail of a new timber private stair which rises to an attic conversion comprising two bedrooms and a bathroom.*

(i) *On* ***Worksheet Q11(c)****, state the names of the component parts of the stair lettered A to F.*

See **Worksheet Q11(*c*)** for answers.

One mark for correctly identifying each component part. 6×1 **6**

(ii) *State on the* ***Worksheet****, the minimum permitted dimension for each of the following:*

- *height of the handrail*
- *going at points X and Y*
- *width of stair.*

See **Worksheet Q11(*c*)** for answers.

Height of handrail	840 mm from the pitch line	**1**
Going at point X	50 mm	**½**
Going at point Y	225 mm	**½**
Width of stair	800 mm	**1**

(iii) *Using the dimensions given on the* ***Worksheet****, calculate the rise, going and pitch of the stair and state whether or not the stair complies with the recommendations given in current standards.*

Rise $1400 \div 7 = 200$ mm **½**

Going $1140 \div 5 = 228$ mm **½**

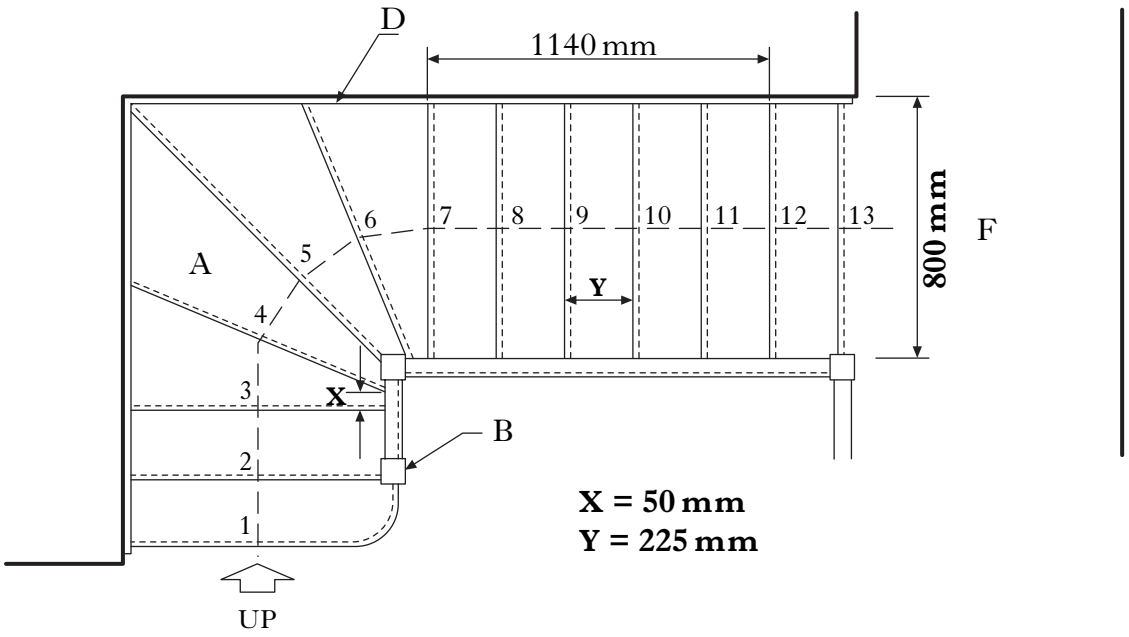
Pitch—tan< = opp ÷ adj

Tan< = 200 ÷ 228	= 0·877
<(pitch)	= inverse tan 0·877
therefore pitch	= 41·250 degrees **3**

Since the maximum pitch permitted for a private stair is 42·00 degrees, the stair illustrated does comply with current standards. **1**

(30)

WORKSHEET Q11(*c*)



PLAN

Question 11(*c*)(i)

A **Winder**

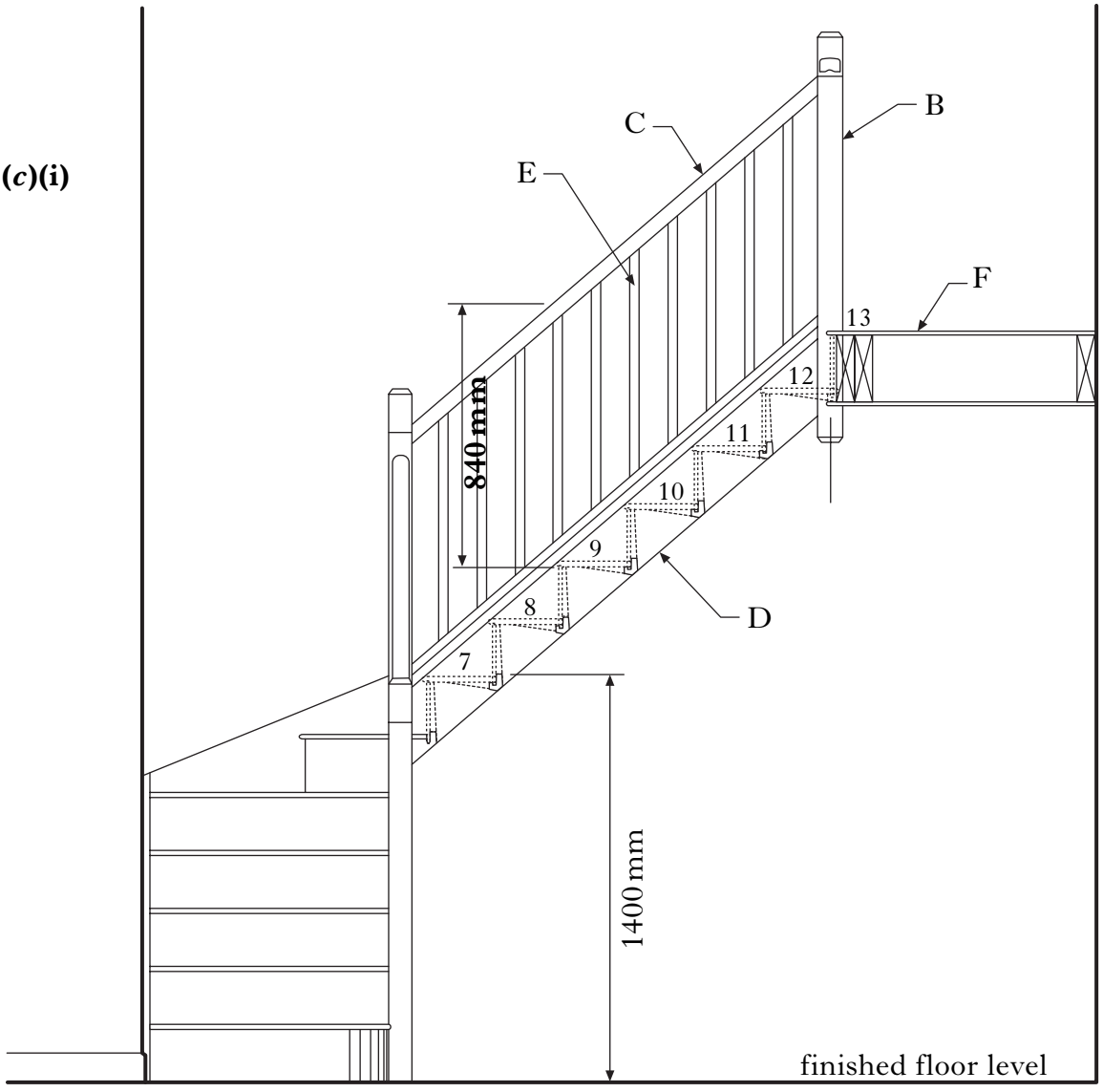
B **Newel**

C **Handrail**

D **String**

E **Balusters**

F **Landing**



ELEVATION

[*END OF SPECIMEN MARKING INSTRUCTIONS*]