2009 Building Construction

Higher

Finalised Marking Instructions

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

Marks

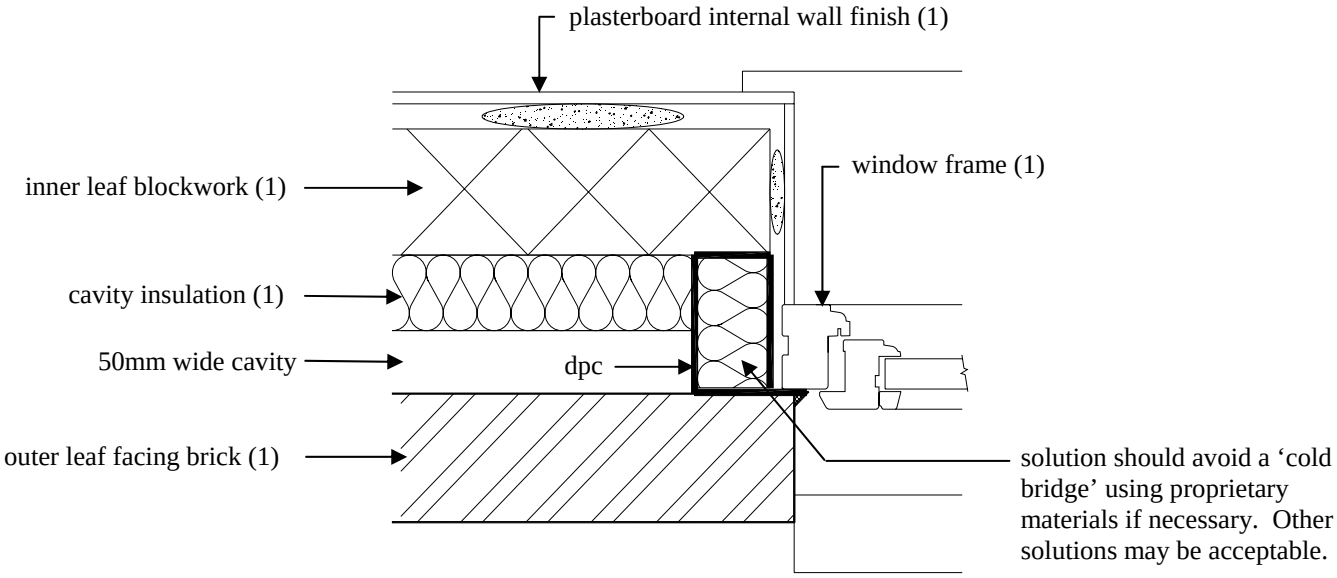
1. (*a*) ***Worksheet Q1(a)*** *shows three types of brickwork bonding.*
On the ***Worksheet****, name the* ***three*** *types of bond.*

See Worksheet Q1(*a*) (P13) **3**

(*b*) ***Worksheet Q1(b)*** *shows a typical modular brick.*
On the ***Worksheet****, name the three parts of the brick and list all three dimensions.*

See Worksheet Q1(*b*) (P14) **3**

2. *Prepare an annotated sketch to show a horizontal cross section through a window jamb in a traditional masonry cavity wall.*
Include all wall finishes.



HORIZONTAL CROSS SECTION THROUGH WINDOW JAMB

5 marks total

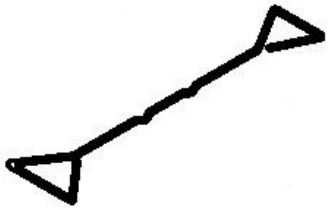
3. ***Worksheet Q3*** *shows a typical joist opening in a suspended timber ground floor.*
On the ***Worksheet*** *name each joist.*

See Worksheet Q3 (P15) **4**

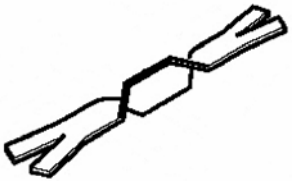
Marks

4. *Prepare a sketch to show each the following types of cavity wall tie.*

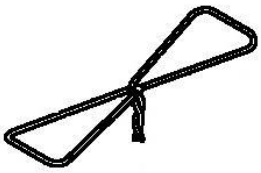
- *Double triangle wire tie*
- *Vertical twist thick plate type*
- *Butterfly wire tie* **3**



Double triangle wire tie



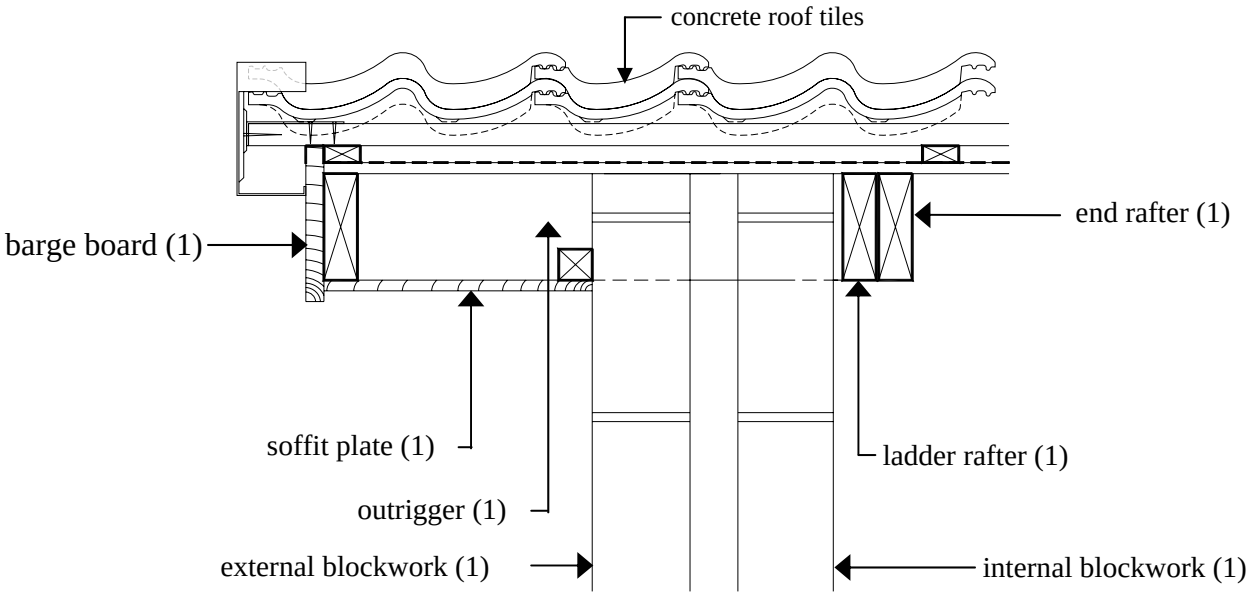
Vertical twist plate type



Butterfly wire tie

5. *Sketch a typical verge detail for a projecting roof to show the following components:*

- *end rafter*
- *outrigger*
- *internal and external blockwork*
- *ladder rafter*
- *barge board*
- *soffit plate*



TYPICAL VERGE DETAIL

Total 6 marks

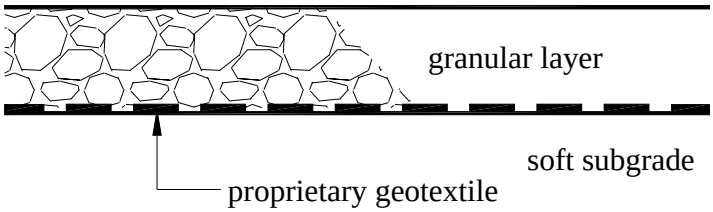
6. (*a*) *Name **two** functions of a building site perimeter fence.* *Marks*

- **Security – to prevent the public from entering the site**
- **Protection – to prevent the public from being injured from activities taking place on the site.** **2**

(*b*) *Describe, with the aid of an annotated sketch a common method of forming a temporary access to a construction site where the bearing capacity of the soil is poor.*

Select one from:

Lay Type 1 or 2 hardcore from a quarry and compact it in layers to provide a suitable temporary road.
OR
Contractor may decide to partly construct the permanent roads on the site but without any kerbs or surface finish. **4**



7. *Briefly describe the following ground investigation methods:*

- *Trial pits*
- *Bore holes*

<u>Trial Pits</u>: this is a relatively cheap method of obtaining soil data by enabling easy visual inspection of the soil stratum in its natural condition. The pits can be hand dug or machine excavated to depths up to 5 metres by approximately 1·2 m wide. Soil samples can be taken for testing. **3**

<u>Bore Holes</u>: 150 mm or 200 mm diameter boreholes are normally made using light percussion equipment. This is normally towed to the borehole positions behind a 4-wheel drive vehicle, and operated by a two-man crew. The borehole is progressed by dropping a weighted hollow tube into the hole, so that soil becomes lodged in its base. The contents are then lifted carefully to the surface. Material taken from the drilling tools is usually retained as small 'disturbed' samples for testing. **3**

8. *Identify **four** items of temporary accommodation which will be required by a contractor during the construction of ten detached dwelling houses.*

Toilet and a facility to wash hands;
Changing facilities and a place to keep clothes;
Canteen;
Office;
Secure Storage Unit. (any four from the list one mark each) **4**

(40)

SECTION B

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

Marks

9. (*a*) *Briefly describe the ground conditions which would require the use of the following foundation types:*

- *deep strip foundation*
- *raft foundation*
- *pad foundation*
- *short bored pile.*

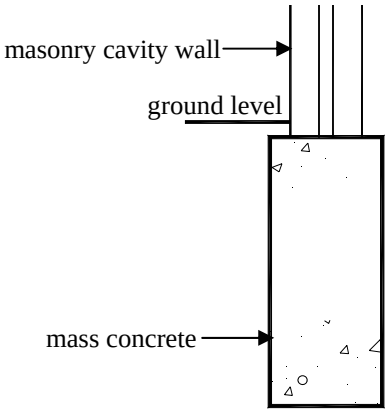
<u>Deep Strip Foundation</u>: Is used if subsoil directly below the surface of the ground is weak or susceptible to moisture movement. The foundation can be taken to a depth where strata is stronger or moisture content does not vary.

<u>Raft Foundation</u>: This form of foundation is used in lightly loaded structures and on soil with poor bearing capacity and where variations of soil conditions necessitates a considerable spread of loads.

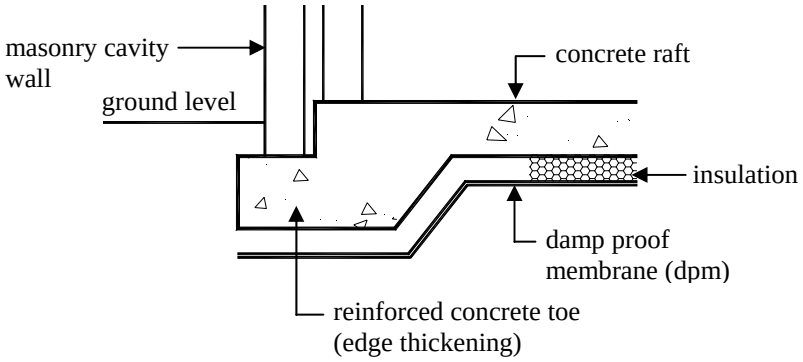
<u>Pad Foundation</u>: Normally used as a foundation for piers/columns of masonry, reinforced concrete or steel and is often in a square/rectangular shaped pad.

<u>Short Bored Pile</u>: These are usually used on small buildings on shrinkable clay soil where moisture can make appreciable volume changes in the subsoil for some depth. **4**

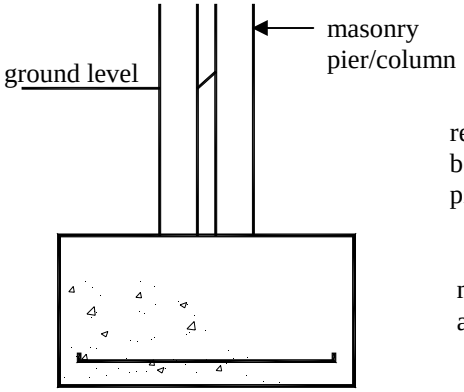
(*b*) *Prepare an annotated sketch to show each of the foundation types listed in Q9(a).*



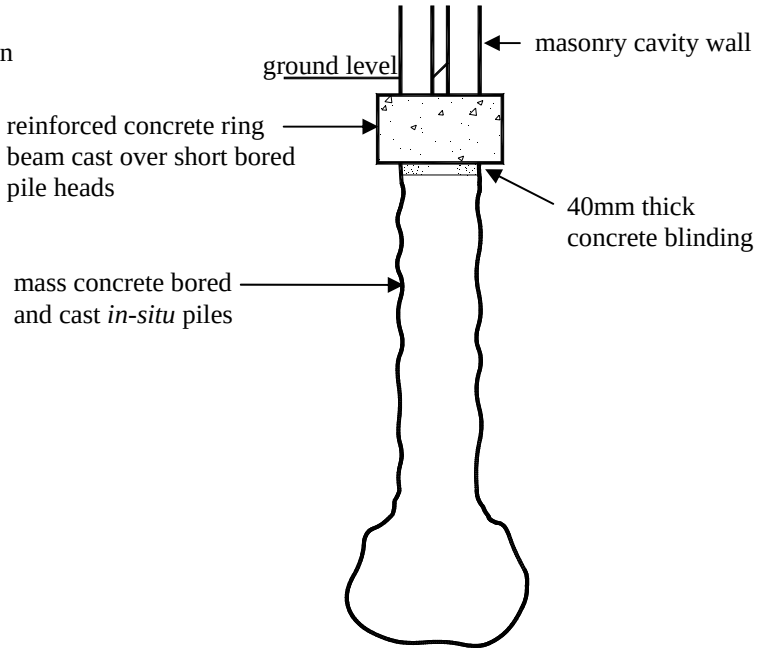
DEEP STRIP FOUNDATION (2)



RAFT FOUNDATION (2)



PAD FOUNDATION (2)



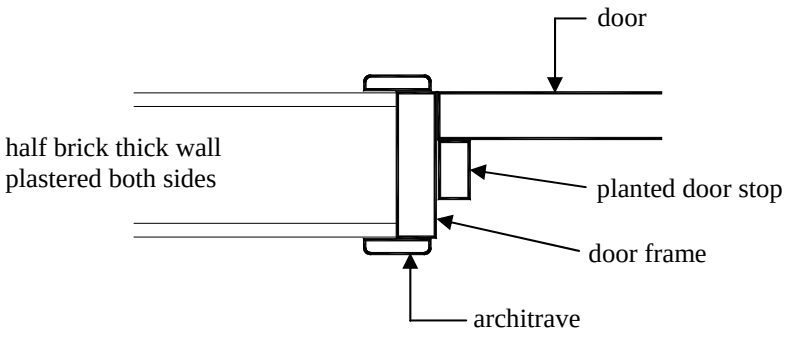
SHORT BORED PILE FOUNDATION (2)

8 marks total

(*c*) *A door and door frame have to be fitted into an internal half brick thick wall. The wall is finished with 12mm plaster to both sides.*

Show by means of an annotated sketch a typical plan detail of the construction using the following timbers:

- *door frame*
- *planted door stop*
- *door*
- *architrave (facing).*



PLAN DETAIL

6 marks

Marks

(*d*) *Briefly explain each of the following terms when used in timber stair construction:*

- *riser*
- *going*
- *newel post*
- *pitch line.*

Riser: This is the vertical surface of the stair step.

Going: This word describes the distance measured horizontally from the face of one nosing to the face of the nosing of the next riser.

Newel post: This is the post at the top and bottom of a stair which firmly houses the handrail.

Pitch Line: This is the imaginary line that links the nosings of every step on the stair. **4**

(*e*) ***Worksheet Q9(e)*** *shows an incomplete vertical section through the external wall and substructure of a timber frame house with a suspended timber floor.*

On the worksheet, complete the detail to show the following components:

- *ring beam*
- *joists*
- *sole plate*
- *timber studs*
- *damp proof course*
- *breather membrane*
- *sheathing*
- *insulation.*

See Worksheet Q9(*e*) (P16) **8**

(30)

[Turn over

Marks

10. (*a*) *Briefly describe how the following construction materials should be stored on site:*

- *roof trusses*
- *uPVC windows*
- *bags of Portland cement*
- *facing bricks.*

Roof trusses:
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**

uPVC windows: should be stored vertical on a level surface. Care must be taken to ensure they do not distort. Should also be stored in a secure location. **2**

Portland cement: Must be stored in a dry weatherproof enclosed hut with a dry floor. Store on a timber platform away from the walls and cover with polythene. **2**

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**

(*b*) *Briefly explain **three** key factors which must be considered when planning the establishment of a construction site.*

The following should be considered when establishing a construction site:
Site activities – the time required to carry out the principal activities, eg the regular supply of ready mixed concrete.
Efficiency – the site layout must aim at maintaining the desired output, eg minimize double handling where possible.
Movement – problem on restricted sites. Restriction on delivery lorries etc.
Facilities – toilets, offices etc. Must comply with current legislation.

6

Marks

(*c*) *Briefly describe how the following floor finishes should be applied to a suspended timber floor:*

- *Timber laminate flooring*
- *Quarry tiles*

<u>Timber laminate flooring</u>: prepare existing floor and lay new proprietary underlay. Fit laminate boards on top of underlay ensuring boards are staggered (offset). Allow a gap of approximately 10 mm between the boards and the skirting. **2**

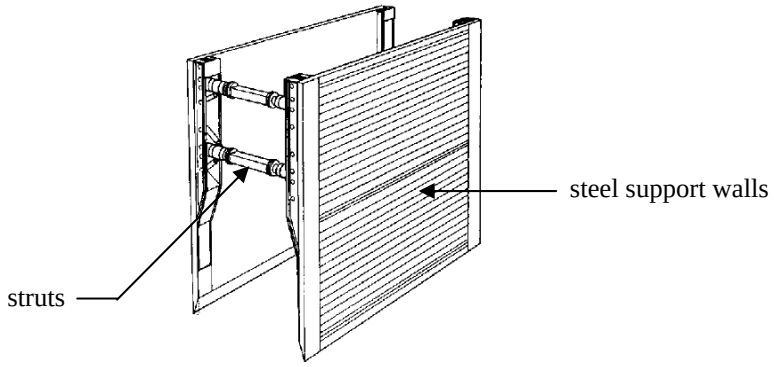
<u>Quarry tiles</u>: Prepare existing floor then spread flexible adhesive and lay tiles to a level surface finish pressing tiles firmly into the adhesive with a twisting action. Use tile spacers to ensure regular spacing between tiles. Grout tiles with flexible grout. **2**

Marks

(*d*) *A foundation trench 1·5 metres deep requires support.*

(i) *Briefly describe with the aid of an annotated sketch the trench support arrangements and indicate the health and safety requirements.*

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.



Health and Safety legislation must be followed at all times to prevent collapse of the trench. Risks must be assessed prior to work proceeding. **6**

(ii) *Ready mix concrete is required to be placed in this trench. Briefly explain the following terms relating to fresh concrete:*

- *Compaction*
- *Curing*

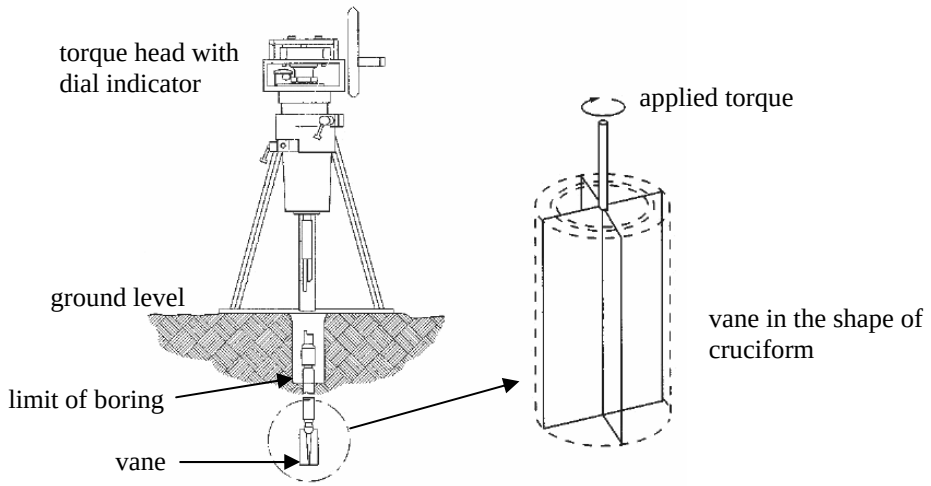
<u>Compaction of the concrete</u>: may be undertaken by using either a poker vibrator or a beam vibrator. The poker vibrator (one of the most common) is inserted into the concrete during pouring/placing operations to coat the aggregate in cement paste and release trapped air. **3**

<u>Curing</u>: 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. **3**

(30)

Marks

11. (*a*) *Briefly describe, with the aid of an annotated sketch, the Vane test used during ground investigation.*



The vane comprises four blades 150 mm long set at right angles to each other in the shape of a cruciform. The vane test provides a means of measuring the undrained shear strength of soft or firm clay soil *in-situ*. The vanes are pushed into the clay soil ahead of the borehole and the torque required to twist the vanes is measured. The maximum torque is recorded. **6**

(*b*) Briefly describe **three** sources of information an engineer would use to assist in a site investigation. Provide a brief explanation of your three sources of information you have selected.

Information from the desk study such as topography maps, Ordnance Survey maps from different periods, aerial photographs, and information from the coal authority.
Information from local authority such as existing services, any restrictions, means of access to the site and other local restrictions. **6**

(*c*) Briefly explain what is meant by *site reconnaissance* and state two advantages of undertaking such a reconnaissance.

The object of the site reconnaissance survey is to check and make additions to the information already collected during the desk study. The site and its surrounding area should be visited and covered carefully on foot.
Local authorities, local inhabitants and people working in the area, such as builders, electricity and gas workers, should be questioned to obtain the benefit of their local knowledge.
Two benefits would be:
The visual inspection of the site and the surrounding buildings.
Local enquiries about the site and the surrounding area. **6**

Marks

(*d*) (i) With reference to stair construction, briefly explain what is meant by the following terms:

- Closed stringer
- Open cut stringer
- Winder (kite winder)

<u>Closed stringer</u>: The closed string staircase, unlike the cut string staircase, has a closed string and treads are not visible from the side.

<u>Open cut stringer</u>: this is where each step projects over the stringer.

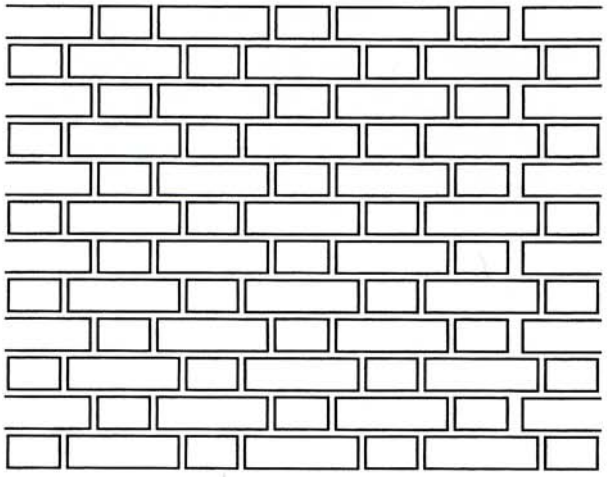
<u>Winder (kite winder)</u>: this is where the stair turns at 90 degrees and the treads taper round without the integration of a landing. **6**

(ii) *Briefly explain the relationship between the pitch line, total rise and total going.*

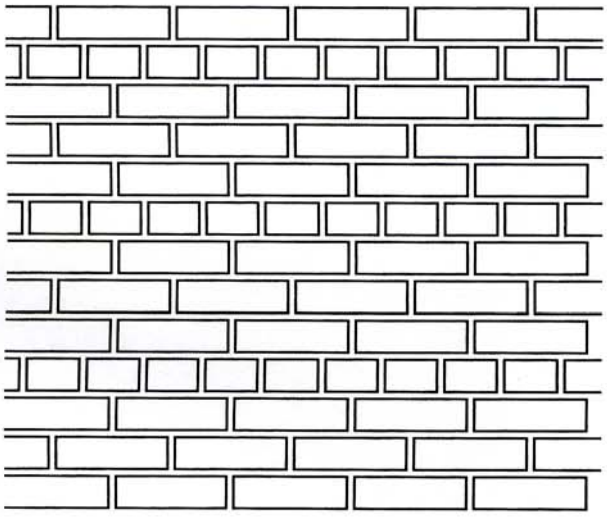
The pitch line is the imaginary line that touches the nosings of each step in the staircase. The total rise is the floor to floor dimension and the total going is the full horizontal length of the stair. **6**

(30)

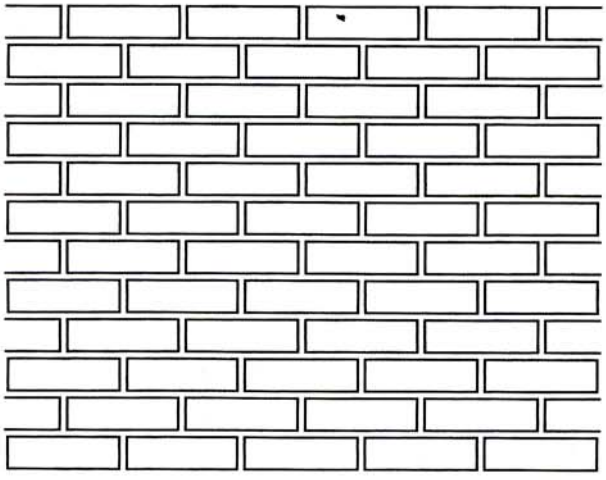
WORKSHEET Q1(*a*)



(i) Flemish Bond (1)

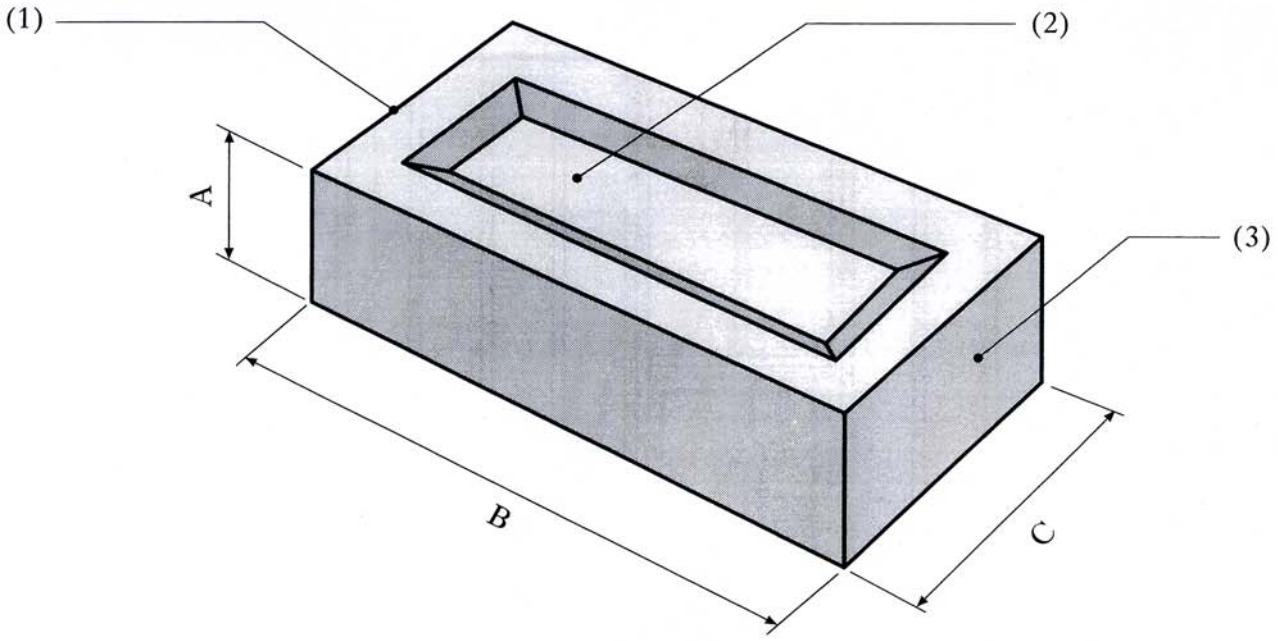


(ii) English Garden Wall Bond (1)



(iii) Stretcher Bond (1)

WORKSHEET Q1(*b*)



(1) Arris (1/2)

(2) Frog (1/2)

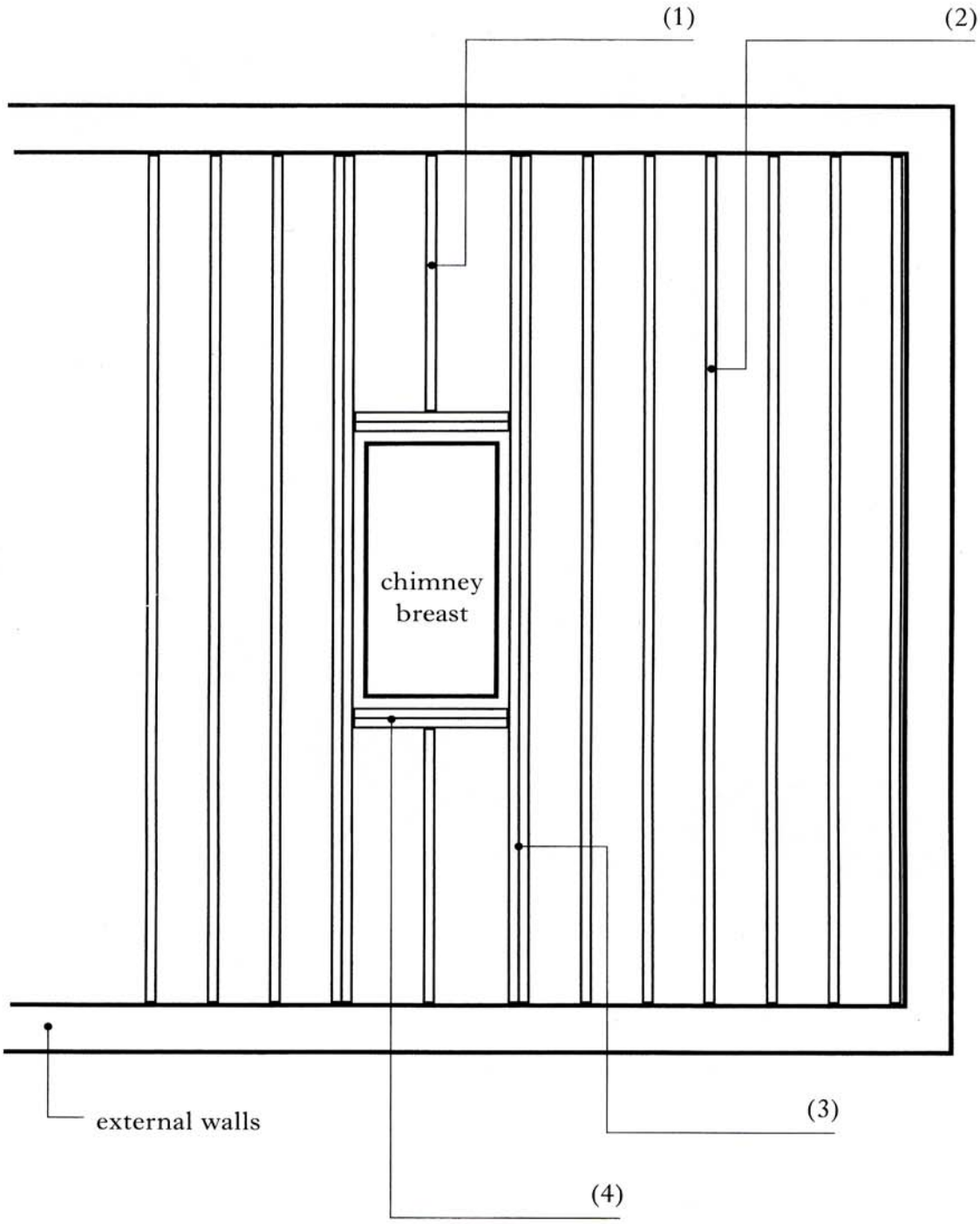
(3) Header face (1/2)

Dimension A 65 mm (1/2)

Dimension B 215 mm (1/2)

Dimension C 102.5 mm (1/2)

WORKSHEET Q3



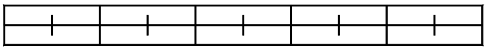
(1) Trimmed joist (1)

(2) Common joist (1)

(3) Trimming joist (1)

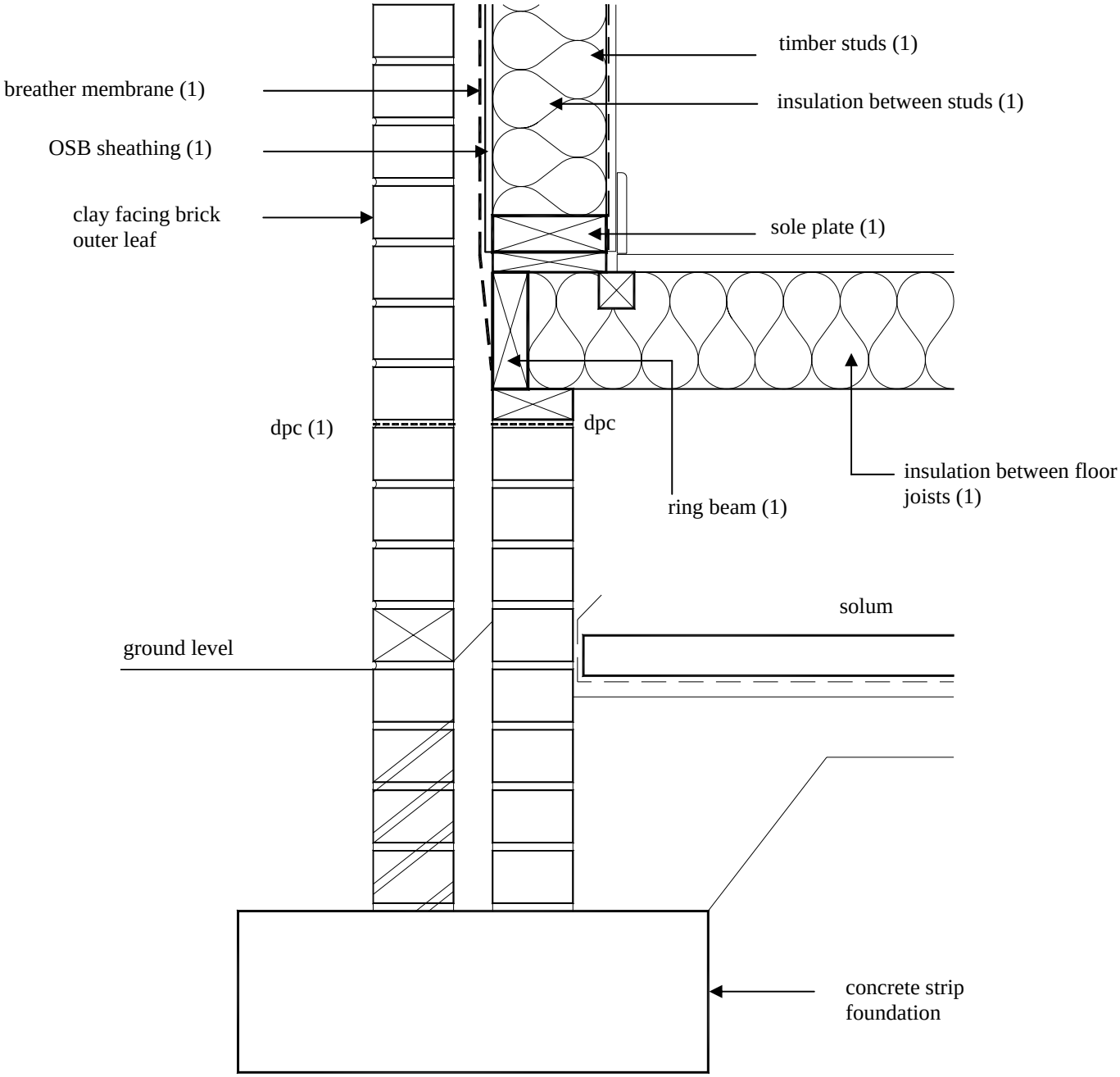
(4) Trimmer (1)

WORKSHEET Q9(*e*)



500 **0**

scale of millimetres



[END OF MARKING INSTRUCTIONS] **Total 8 marks**