



# Coimisiún na Scrúduithe Stáit State Examinations Commission

Scéimeanna Marcála  
**Staidéar Foirgníochta**

Scrúduithe Ardeistiméireachta, 2007  
**Gnáthleibhéal**

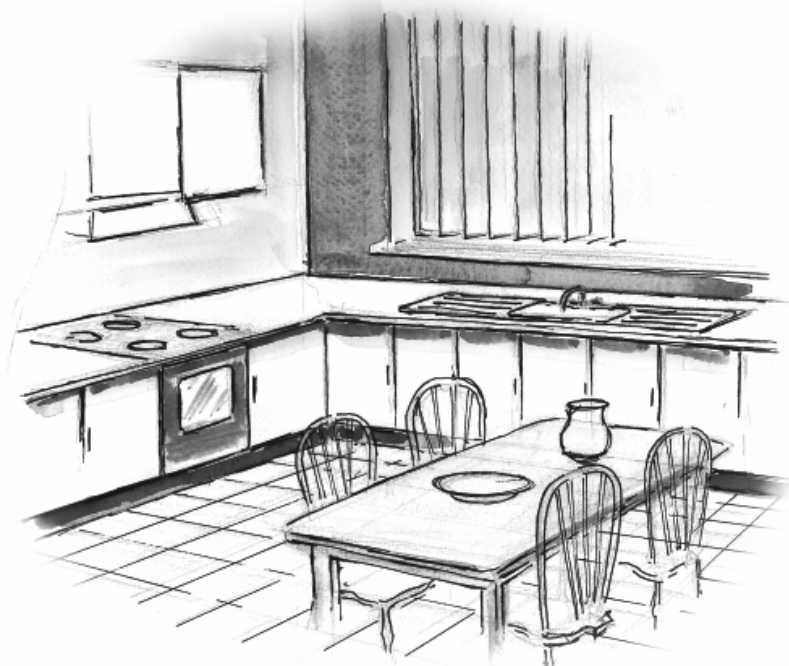
Marking Scheme  
**Construction Studies**

Leaving Certificate Examination, 2007  
**Ordinary Level**



**Coimisiún na Scrúduithe Stáit**  
*State Examinations Commission*

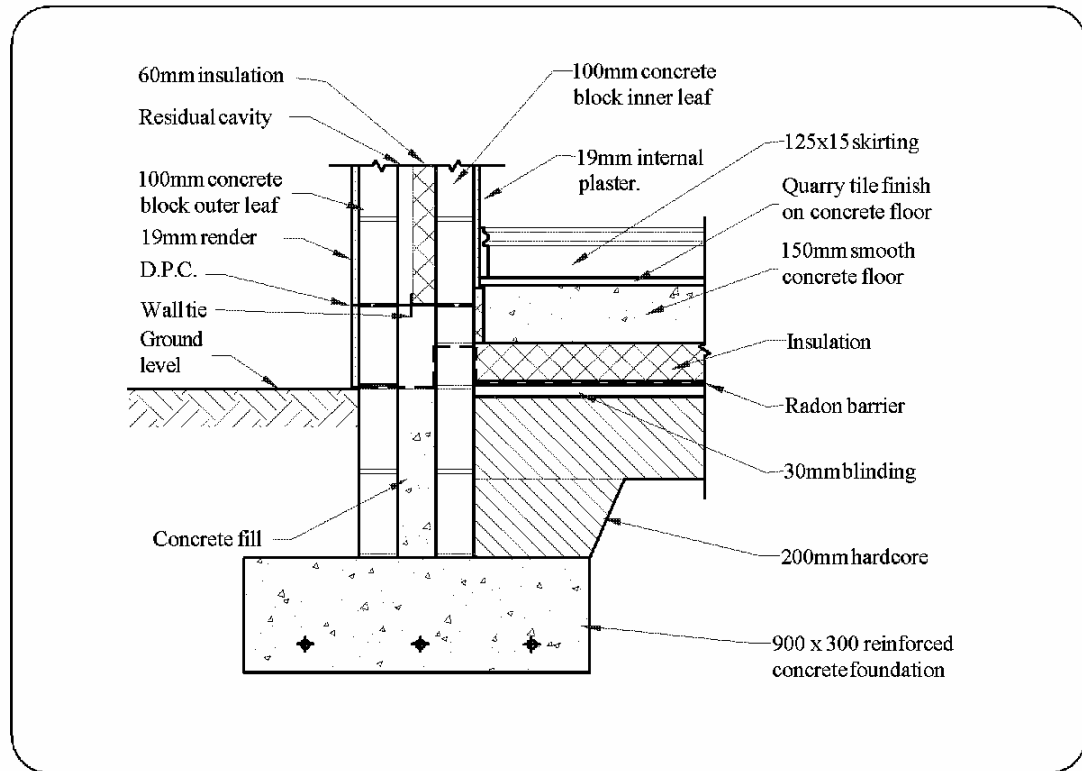
*Scrúdú Ardteistiméireachta 2007*



*Staidéar Foirgníochta*  
*Teoiric – Gnáthleibhéal*

*Construction Studies*  
*Theory – Ordinary Level*

## Ceist 1



### Part (b)

#### Vinyl

- Vinyl resists scuffs and stains in normal use
- Water will not easily discolour the floor surface
- The surface is easy to maintain
- There is a wide variety of colours and patterns available.

#### Linoleum

- This surface does not damage easily
- It is environmentally friendly
- The surface is quiet and comfortable to walk on.

#### Wood laminate

- Laminate is very durable and can withstand considerable wear
- The floor surface requires less maintenance than natural wood
- The cost of this floor is less than a solid wood floor
- Liquids will not cause the same damage as they might to a natural wood floor.

#### Stone

- Examples: polished granite, marble, limestone and slate.
- These floors are hardwearing and durable.

#### Marmoleum

- More for industrial use but may be used in kitchens
- Hardwearing, waterproof and available in variety of colours
- Other suitable covering.

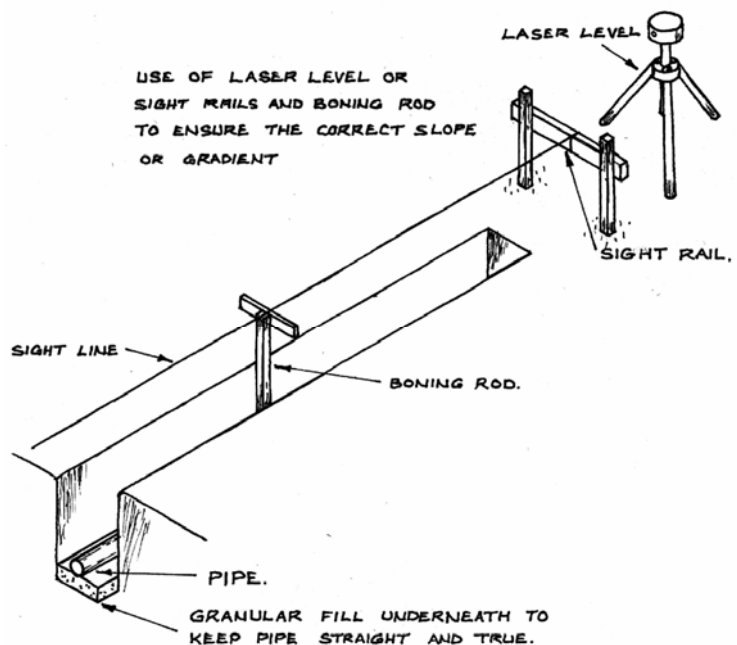
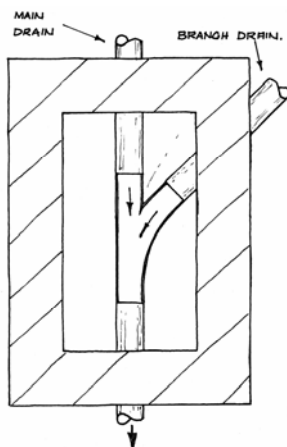
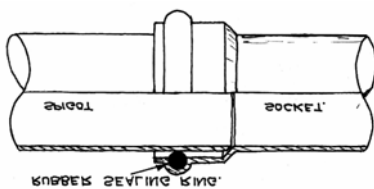
<b>Question 1</b>	
<b>Details</b>	<b>Marks</b>
19 mm external render	<b>4</b>
100mm concrete block outer leaf	<b>4</b>
D.P.C.	<b>4</b>
Wall tie	<b>4</b>
40 mm residual cavity	<b>4</b>
Insulation	<b>4</b>
100 mm concrete block inner leaf	<b>4</b>
13 mm internal plaster	<b>4</b>
Skirting board	<b>4</b>
Quarry tiles	<b>4</b>
Concrete floor	<b>4</b>
Insulation	<b>4</b>
D.P.M./radon barrier	<b>4</b>
Blinding and hardcore	<b>4</b>
Foundation with reinforcing bars	<b>4</b>
Concrete fill	<b>4</b>
Any <b>nine</b> of above details (4 marks each detail)	<b>Sub-total</b> <b>36</b>
<b>Draughting, accuracy and scale</b>	<i>(excellent, good, fair)</i> <b>8</b>
<b>Part (b) Name</b>	<b>2</b>
Two reasons. <i>(2 x 2 marks)</i>	<b>4</b>
<b>Total</b>	<b>50 marks</b>

## Ceist 2

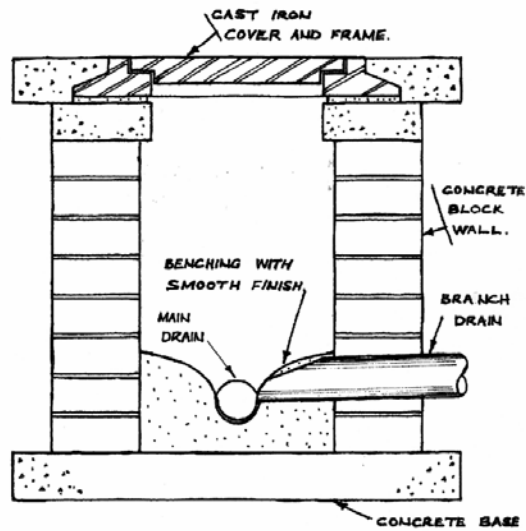
### Part (a)

The following are some of the considerations to be taken into account when laying sewer pipes:

- The layout should be straight and as simple as possible
- Pipes should be laid in a straight line and changes in direction kept to a minimum
- Granular fill beneath the pipe compacted to ensure firm base and to prevent sagging
- Connections should be made obliquely to the main drain and in the direction of the flow
- The pipes should be laid to an even slope or gradient. For example, a 6.0 metre long uPVC sewer pipe with a 100mm internal diameter the slope may be 1:40
- The drainage system should be ventilated through a vertical pipe near the head of the main drain
- The system should have sufficient access points. These access points should be provided at or near the head of each drain, where bends occur, where there is a connection to another drain or where there is a change of pipe size
- The joints in the pipe work should be both water and airtight and joints should be sealed and tested before backfilling takes place
- In manholes or inspection chambers the branch pipe should join at or above the level diameter of the main pipe
- Ensure when joining pipes that the rubber sealing ring is inserted properly otherwise blockages and leakages may occur
- Where there is a socket end on the pipe, this end should face direction of flow.



## Part (b)



## Part (c) - reasons for location of inspection chamber at A

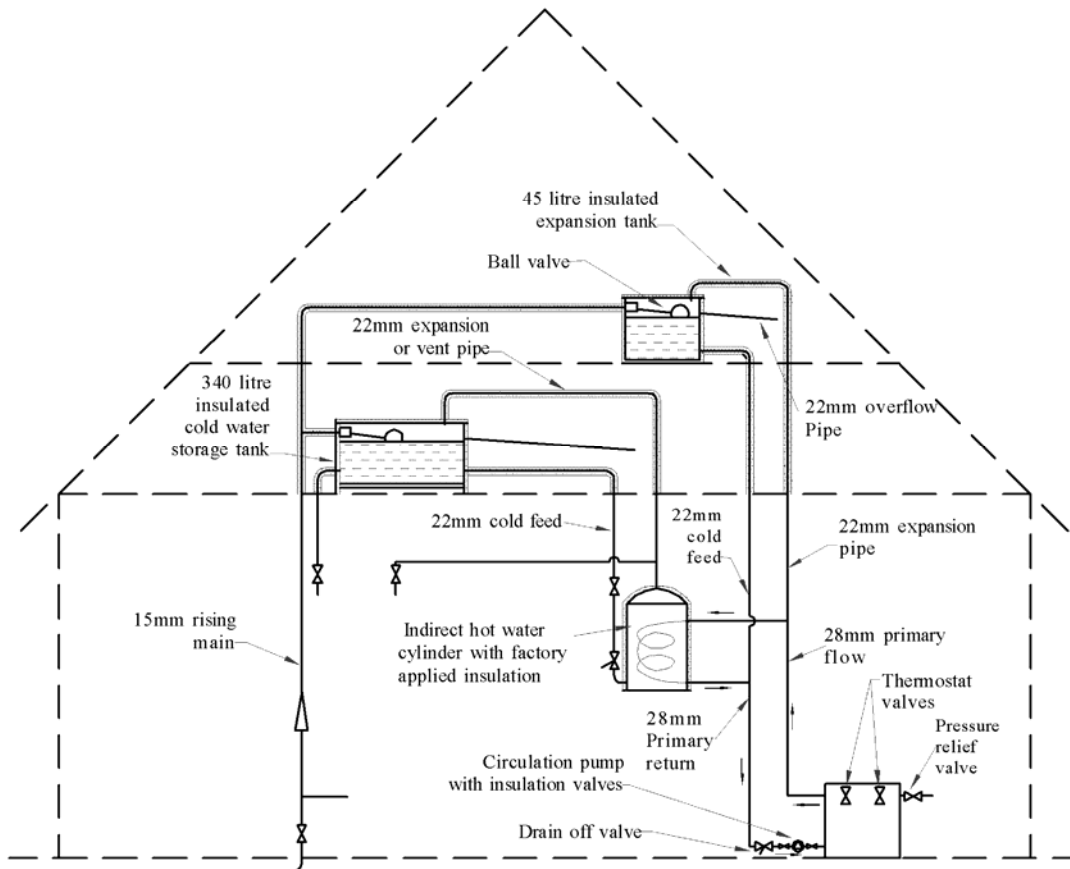
The inspection chamber is located at A for the following reasons:

- Blockages are more likely to occur at this point and access is required to clear the blockage
- Access is required where there is a junction with another drain
- Access is required where there is a change of direction.

<b>Question 2</b>	
<b>Details</b>	<b>Mark</b>
<b>Part (a)</b>	
Primary communication of relevant information.	<b>6</b>
Other communication of relevant information	<b>4</b>
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Part (b)</b>	
Concrete foundation	<b>4</b>
Side walls	<b>4</b>
Position of main drain	<b>4</b>
Position of branch drain	<b>4</b>
Benching to the drain	<b>4</b>
Cover of inspection chamber	<b>4</b>
<i>Any 5 of above details (4 marks each)</i>	
<b>Quality of sketch</b>	<b>6</b>
<i>(excellent, good, fair)</i>	
<b>Part (c)</b>	
Reason for position of inspection chamber	<b>4</b>
<b>Total</b>	<b>50 marks</b>

### Ceist 3

- Pipe work for connecting boiler to both cylinder and expansion tank
- Insulate all pipework
- Flow and return indicated by directional arrows on flow and return pipes.





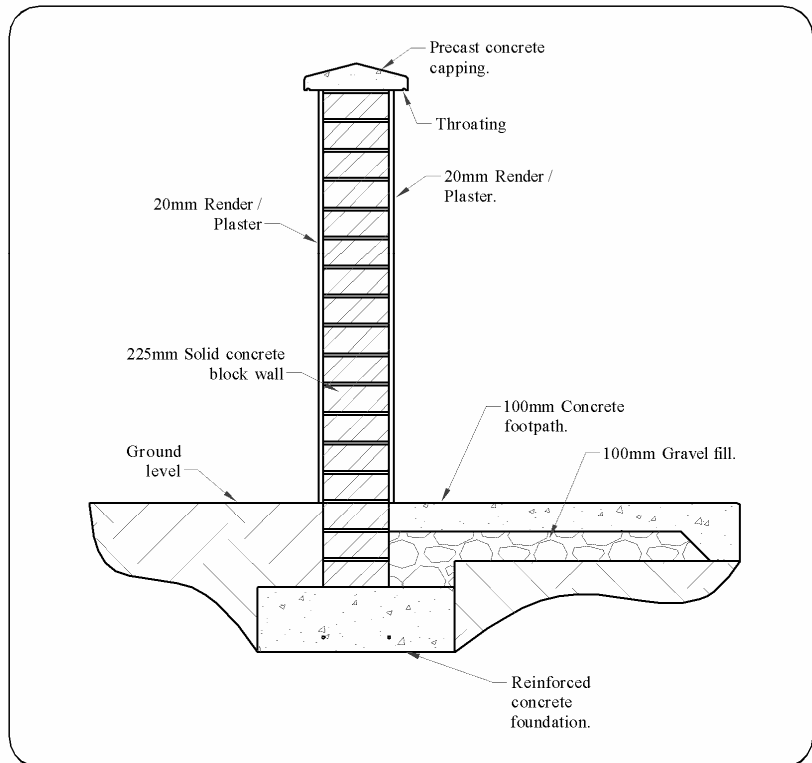
<b>Question 3</b>		
<b>Details</b>		<b>Marks</b>
15 mm rising main.		<b>4</b>
Ballvalve.		<b>4</b>
Expansion tank with insulation.		<b>4</b>
22 mm cold feed with insulation from expansion tank.		<b>4</b>
28 mm primary return.		<b>4</b>
Drain off valve.		<b>4</b>
Circulation pump		<b>4</b>
Oil boiler.		<b>4</b>
Thermostat valves.		<b>4</b>
Pressure relief valve.		<b>4</b>
28 mm primary flow.		<b>4</b>
22 mm min vent pipe with insulation to expansion tank.		<b>4</b>
Indirect hot water cylinder with insulation.		<b>4</b>
22 mm min expansion pipe with insulation to storage tank.		<b>4</b>
22 mm typical cold feed from storage tank.		<b>4</b>
<b>Any 10 of above details (4 marks each)</b>	<b>Sub-total</b>	<b>40</b>
<b>Quality of sketch</b>	<i>(excellent , good, fair)</i>	<b>6</b>
<b>Part (b)</b>		
Direction of arrows.		<b>4</b>
	<b>Total</b>	<b>50 marks</b>

## Ceist 4. Part (a) Garden wall and foundation detail

### Part (b)

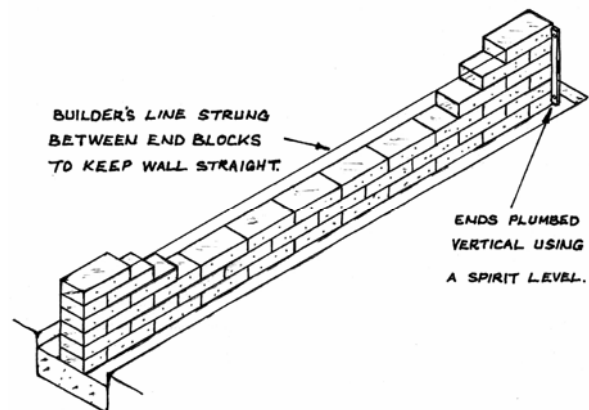
#### Plumb

- Walls built by first laying two or more rows of blocks at both ends of the wall. Skill and great care are needed to make sure the ends are plumb
- Hold spirit level upright to read plumb to the end and side of the wall.
- Sight blocks from blocks already built to ensure they are plumb
- Any adjustments to the blocks are made by tapping lightly with a lump hammer.
- Constantly check that the face of the wall is plumb by placing the spirit level vertically on the wall at distances approximately equal to the length of the spirit level.



#### Straight

- A builder's line or string is pulled from one end block to the other and is used as a guide for building the remaining blocks between the ends
- Care is taken not to touch or move this line
- Mortar to correct consistency is laid along the top of row and is buttered to end of block
- A middle block is laid in long walls and the line supported on it in order to keep the line straight and true. This block is plumb and checked for straightness
- A laser level may also be used to determine plumb and level
- A long straight edge is held horizontally along the face of the wall to check for straightness
- The straightness of the wall is also checked by sighting down the builder's line and any adjustments made.



<b>Question 4</b>	
<b>Details</b>	<b>Marks</b>
<b>Part (a)</b>	
Foundation	<b>4</b>
Gravel fill	<b>4</b>
Concrete footpath	<b>4</b>
19mm plaster	<b>4</b>
Concrete block wall	<b>4</b>
Precast concrete capping	<b>4</b>
Throating	<b>4</b>
19mm plaster	<b>4</b>
Ground level	<b>4</b>
<b>Any 8 of above details (4 marks each)</b>	
<b>Sub-total</b>	<b>32</b>
<b>Draughting, accuracy and scale</b>	<i>(excellent, good, fair)</i> <b>8</b>
<b>Part (b)</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Total</b>	<b>50 marks.</b>

**Ceist 5 Part (a) Safety precautions such as:**

**Safety precautions when using an angle grinder to cut a mild steel reinforcing bar such as:**

- Use safety goggles
- Use steel capped boots
- Ensure that the steel bar is securely held in place
- Check to make sure the angle grinder and cable are in good condition
- Ensure that the power cable is well away from the cutting disc
- Do not allow people to stand near the cutting operation
- Ear muffs should be worn.

**Safety precautions when using a nail gun such as:**

- Use safety goggles
- Follow the manufacturer's instruction carefully
- Hold the batten firmly against the wall
- Stand on a firm and secure surface
- Use the correct size of nail and cartridge
- Ensure that people involved have correct site training
- Ensure that the first pressure safety nozzle is held securely against the batten
- Check for plumbing or electrical cables within the wall.

**Safety precautions when using an electrical extension lead on a construction site such as:**

- Make sure the cable is in good condition and of the correct size and suitable for external use
- Unwind the cable fully
- Do not use the lead in wet conditions
- Do not overload the lead
- Protect the cable from heavy traffic or sharp objects.

**Part (b)**



Symbol for safety goggles



Symbol for hard hat

**Part (c)**

Additional safety precautions to be observed on a construction site are as follows:

- Wear high visibility jacket
- Wear correct footwear
- Be aware of machinery operating on site
- Be familiar with site notices and take heed of them
- Have completed the "safe pass" training course
- Look out for open trenches and note signs for same
- Use power tools correctly and be aware of their limits. Use 110 volt tools and equipment on site.

<b>Question 5</b>	
<b>Details</b>	<b>Marks</b>
<b>Part (a)</b>	
<b>Using an angle grinder:</b>	
Precaution 1	<b>5</b>
Precaution 2	<b>5</b>
<b>Using a nail gun:</b>	
Precaution 1	<b>5</b>
Precaution 2	<b>5</b>
<b>Using an electrical extension cable:</b>	
Precaution 1	<b>5</b>
Precaution 2	<b>5</b>
<b>Part (b)</b>	
Sketch a hard hat	<b>5</b>
Sketch safety goggles	<b>5</b>
<b>Part (c)</b>	
Safety precaution 1	<b>5</b>
Safety precaution 2	<b>5</b>
<b>Total</b>	<b>50 marks.</b>

## **Ceist 6**

### **Part (a) ready - mixed concrete**

Ready-mixed concrete is now widely used in the construction of modern buildings and in the renovation of older buildings. Concrete is a very versatile material and has many applications in building today. Situations where ready-mix concrete may be used are as follows:

- Placing foundations
- Laying ground floors and solid upper floors
- Casting special lintels in-situ
- Construction of footpaths and access roads
- Construction of solid flat roofs.

### **Advantages of using ready-mixed concrete:**

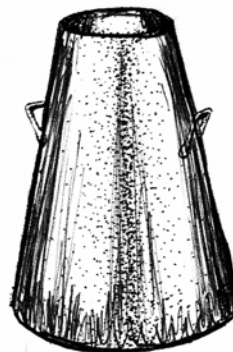
- The quality is consistent and can be designed to suit the situation. This is not always the case with on-site production
- Correct water / cement ratio
- Ready mixed concrete is produced under strict standards ensuring good final mix. The standard of production on site may not be consistent
- The price of ready-mix concrete is competitive and convenient. However, it is sometimes cheaper to produce concrete on site for small batches
- It eliminates the need for mixing large amounts of concrete on the site. Specialised expensive equipment is needed for concrete production on site.
- The amount of aggregate and sand and cement stored on site is reduced. Storage on site leads to wastage. Large quantities need extra labour and facilities.

### **Part (b)**

The slump test is carried out on site to check the consistent workability of batches of concrete. This is a simple but precise test requiring simple equipment and standard procedures must be rigorously followed.

The equipment required:

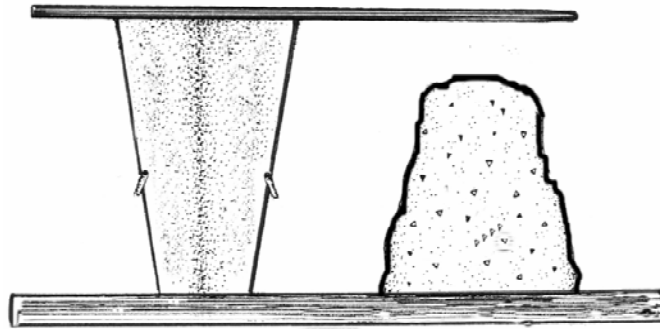
- Standard slump cone
- Tamping rod
- Solid metal base plate
- Scoop and bucket
- Cleaning cloths
- Steel float
- Mixing tray.



*Sketch of standard slump con*

### Method of carrying out slump test:

- Select three samples of concrete from the mix
- Mix these together on the mixing tray
- Make sure the cone is clean
- Place the cone on the metal plate on a level surface
- Stand on the metal feet.
- Fill the cone in three layers and rod each layer 25 times
- Strike off the surplus concrete using the steel float
- Wipe the cone and base plate clean.
- Carefully lift the cone vertically and clear off the concrete
- Rest the tamping rod across the inverted cone so that it reaches over the slumped concrete
- Using the ruler measure the distance from the underside of the rod to the highest point of the slump to the nearest 5 mm
- This is the slump.

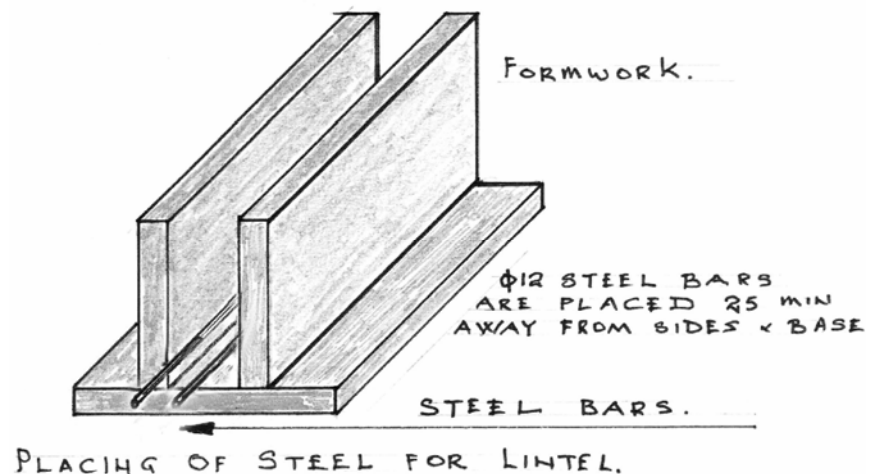


*Sketch of upturned cone*

### Part (c)

Steel is used in concrete to give tensile strength. Concrete is strong in compression but weak in tension. The insertion of steel gives the tensile strength required and is a good example of using the best of both materials in combination.

- In a concrete lintel the steel is placed at the bottom of the formwork - generally 12 mm mild steel bars are used
- Minimum concrete cover of 25 mm is needed and the bars are placed to allow for this
- Special plastic spacers are used to keep the steel away from the sides and base of the formwork
- A good cover of concrete is very important as it prevents corrosion of the steel over the years.



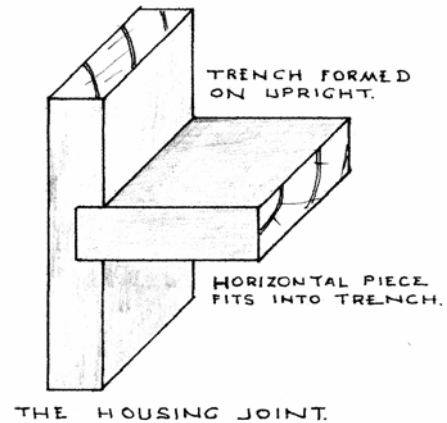
<b>Question 6</b>	
<b>Details</b>	<b>Marks.</b>
<b>Part ( a )</b>	
<b>Use of ready-mix concrete:</b>	
Situation 1	<b>4</b>
Situation 2	<b>4</b>
Advantage 1	<b>4</b>
Advantage 2	<b>4</b>
<b>Part (b)</b>	
<b>The slump test - notes:</b>	
Equipment and preparation	<b>6</b>
Procedure and result	<b>6</b>
<b>The slump test – overall sketching (cone, slump, measurements)</b>	
Two sketches ( <i>3 marks each sketch</i> )	<b>6</b>
<b>Quality of sketch</b> <span style="float: right;"><i>(excellent, good, fair)</i></span>	<b>6</b>
<b>Part (c )</b>	
<b>Steel in lintel:</b>	
Primary communication of relevant detail	<b>6</b>
Other communication of relevant detail	<b>4</b>
<b>Total</b>	<b>50 marks</b>



## Ceist 7

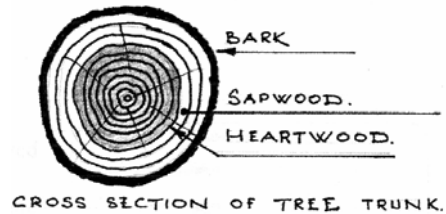
### Housing Joint:

- The housed or housing joint is widely used in woodwork
- It is simple but effective method of joining two pieces of wood together
- The joint is ideal for shelving
- This joint may also be used for the division of a wooden box
- The joint can be strengthened using glue or pins
- The stopped housing joint may also be used and gives a neater appearance.



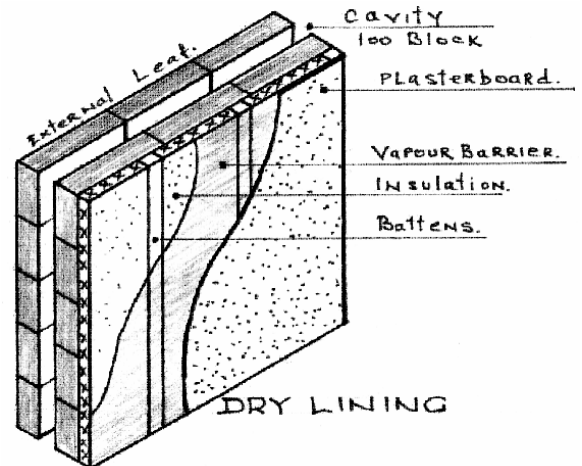
### Sapwood:

- This is the outer area of the cross section of a tree
- This layer contains the sap and the new wood
- It is the newer wood
- It is lighter in colour
- Sapwood is softer and less durable
- New wood is added on each year as annual rings.



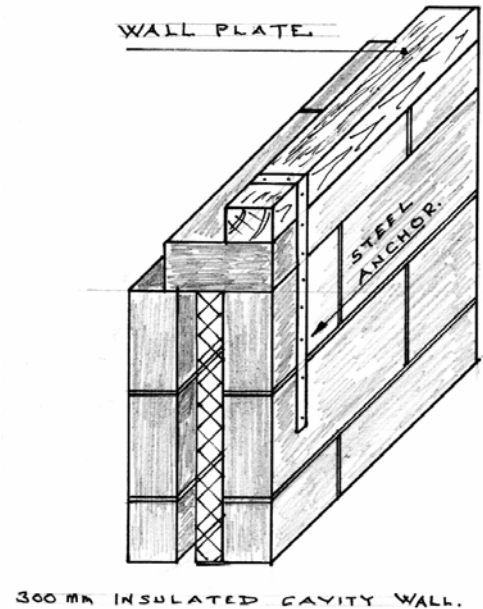
### Dry Lining:

- Usually of plasterboard of 12 mm thickness fixed to battens
- This is a very popular method used to give a smooth finish on the inner surfaces of external walls
- It may be used for cavity or solid walls
- The dry lining consists of pressure treated softwood battens fixed to the wall
- Thermal insulation is fixed between the battens
- A vapour barrier is placed over the battens and insulation
- Plasterboard may include insulation and a vapour barrier
- The surface may then be skim coated or taped and jointed and then painted
- Dry lining helps prevent dampness in older houses and improves insulation standard.



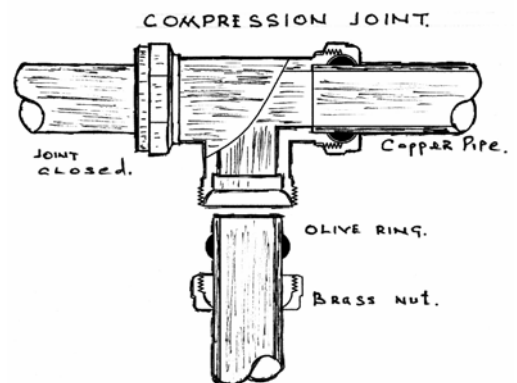
### Wall plate:

- A horizontal softwood member laid on top of an external or internal load bearing wall
- The size may vary but generally the cross section is 100 x 75 mm
- The rafters are fixed to the wall plate using a bird's mouth joint together with nailing
- The wall plate also supports the joists
- The wall plate is treated with preservative
- Galvanised steel anchor straps are used to fix the wall plate to the wall
- The wall plate distributes the weight evenly over the load bearing wall



### Compression fitting:

- This may also be called a compression joint
- It is used in plumbing and is the common joint used for copper and PVC pipes
- The joint is made of brass or PVC and is available in a wide range of sizes
- The ends of the pipes are cut square and the nut placed over the end
- The olive is then placed over the pipe
- The nut is tightened and this compresses the olive to form a watertight joint.



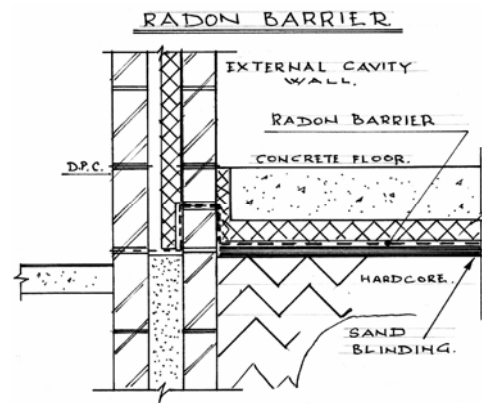
### Wall tie:

- Wall ties are used in cavity walls to link the internal leaf with the outer leaf
- The wall ties are made of stainless steel, galvanised steel or polypropylene
- The function of wall ties is to connect the inner and outer leaf so that the wall acts as one unit
- In modern walls the wall tie also holds the insulation in place
- Wall ties are fixed at 900 mm apart horizontally and 450mm vertically
- The shape of the wall tie includes a drip which sheds the water away from the inner wall or leaf.



**Radon barrier:**

- A radon barrier is used to prevent radon gas entering a building
- The barrier also acts as a DPM
- Usually installed by a specialist. The membrane is laid over the total floor area and stepped out over the external walls
- The membrane must be continuous and correctly taped and joined
- The radon barrier is available in 2m rolls, which are 4 m wide and usually of 40 um gauge.



<b>Question 7</b>	
<b>Details</b>	<b>Marks.</b>
<b>Item number 1</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Item number 2</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Item number 3</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Item number 4</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Item number 5</b>	
Primary communication of relevant information	<b>6</b>
Other communication of relevant information	<b>4</b>
<b>Total</b>	<b>50 marks</b>

## Ceist 8

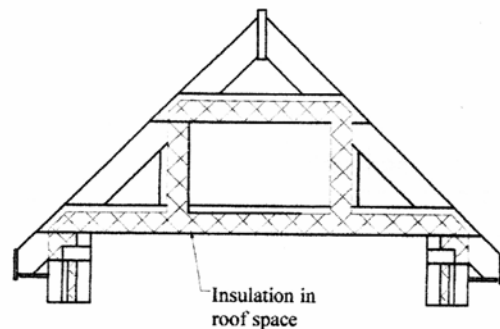
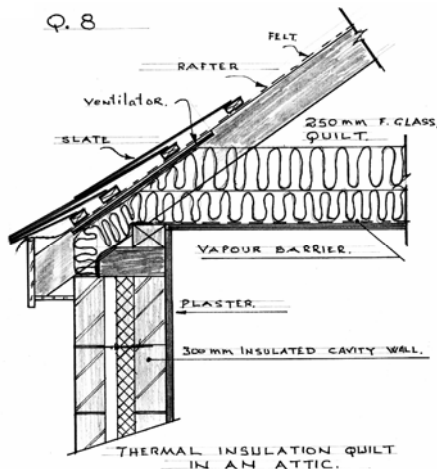
### Part (a) Thermal insulation quilt

A thermal insulation quilt is placed in an attic space to reduce heat loss and energy costs. The thickness has increased over the past number of years in line with new and revised building regulations.

- The insulation quilt is placed between the joists above the plasterboard
- A further layer is placed above the bottom layer
- The total amount of insulation amounts to 250 mm min giving a minimum U-Value of  $0.16\text{W/m}^2 \text{ }^\circ\text{C}$
- If attic development is being carried out then insulation is continued up the sides.

### Part (b)

- The vapour barrier is fitted on the warm side of the insulation
- It is normally in the form of a foil on one side of the plasterboard
- Foil back is faced up with the insulation on top of it
- A polythene membrane will also act as vapour barrier
- The vapour barrier prevents the vapour passing through to the insulation
- The vapour barrier prevents interstitial condensation within the insulation.



### Part (c)

Safety precautions to be observed when placing insulation quilt in an attic:

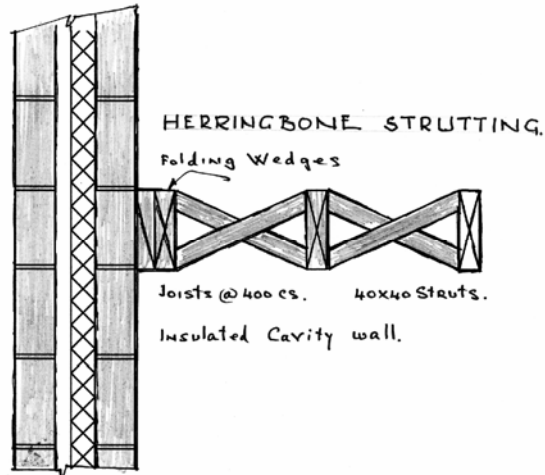
- Wear gloves and long sleeves
- Wear a face mask
- Do not stand directly on the ceiling surface below the joists – stand on a wide board spanning over the joists
- Insulate pipes and storage tank to prevent freezing
- Do not place insulation under the storage tank.
- Other relevant safety precautions.

<b>Question 8</b>	
<b>Details.</b>	<b>Marks.</b>
<b>Part (a) Thermal insulation quilt</b>	
<b>Sketch:</b>	
Insulation	<b>4</b>
Rafters	<b>4</b>
Ceiling joists	<b>4</b>
Quality of sketch	<b>6</b>
<b>Notes:</b>	
Valid detail 1	<b>4</b>
Valid detail 2	<b>4</b>
Valid detail 3	<b>4</b>
<b>Part (b) Vapour barrier.</b>	
Vapour barrier position	<b>5</b>
Reason for position	<b>5</b>
<b>Part (c) Safety precautions:</b>	
Safety precaution 1	<b>5</b>
Safety precaution 2	<b>5</b>
<b>Total</b>	<b>50 marks</b>

## Ceist 9

### Part (a)

Sketch of herringbone bridging/strutting



### Part (b)

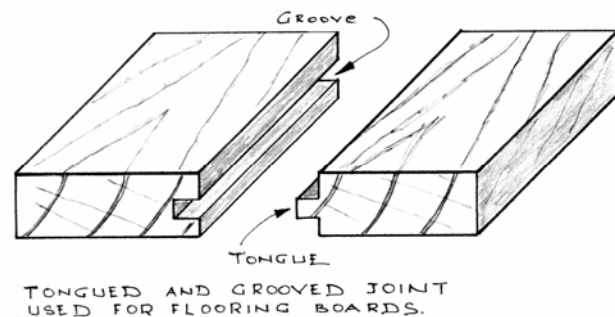
#### Advantages of herringbone bridging:

- The struts fit firmly and is tightened between the joists
- If the joist shrinks the strut will remain pressed against it. The solid bridge would leave a gap
- It is easy to fit the softwood struts (40 mm x 40 mm) in place
- It uses less wood. Solid joist bridging uses a lot of solid material
- Easy to pass electrical cables and plumbing between the joists.

### Part (c)

#### Advantages of tongued and grooved joint:

- It closes the gap between the boards.
- The joint adds strength to the overall floor
- If shrinkage occurs the gap will remain closed
- This method has been used for many years and has a long history of success.
- The joint is not visible and as a result the finished floor looks well.



<b>Question 9</b>	
<b>Details</b>	<b>Marks</b>
<b>Part ( a )</b>	
<b>Herringbone bridging:</b>	
Joist number 1	<b>4</b>
Strut number 1	<b>4</b>
Strut number 2	<b>4</b>
Joist number 2	<b>4</b>
<b>Quality of sketch</b> <span style="float: right;"><i>(excellent , good, fair)</i></span>	<b>6</b>
<b>Part ( b )</b>	
<b>Advantages of herringbone bridging:</b>	
Advantage 1	<b>4</b>
Advantage.2	<b>4</b>
<b>Part ( c )</b>	
<b>Tongue and grooved joint:</b>	
Two boards	<b>4</b>
Tongue	<b>4</b>
Groove	<b>4</b>
<b>Quality of sketch</b> <span style="float: right;"><i>(excellent , good, fair)</i></span>	<b>6</b>
Advantage of the joint	<b>2</b>
<b>Total</b>	<b>50 marks</b>



**Coimisiún na Scrúduithe Stáit**  
*State Examinations Commission*

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*Leaving Certificate Examination 2007*

***Construction Studies***  
***Ordinary Level and Higher Level***

***Marking Scheme***

***Practical Coursework***

*(150 marks)*





**Leaving Certificate Examination 2007**

**Construction Studies**

**School Assessment of Candidates' Practical Coursework**

Name of Candidate: ..... Examination Number:

- Type of Project:
- |   |   |
|---|---|
| <input type="checkbox"/> Practical Craft                | <input type="checkbox"/> Building Science |
| <input type="checkbox"/> Written/Drawn with Scale Model | <input type="checkbox"/> Composite        |

<b>Marking Scheme</b>		<b>Maximum Marks</b>	<b>Marks Awarded</b>								
<b>A</b>	<b>Planning of Project</b> <ul style="list-style-type: none"> <li>• Ability to design an appropriate plan of procedure</li> <li>• Evidence of research</li> <li>• Preparation of working drawings/use of models as graphic aids</li> </ul> <p style="text-align: right;"><b>Subtotal</b></p>	<b>30</b>									
<b>B</b>	<b>Report Writing</b> <ul style="list-style-type: none"> <li>• Design folio detailing planning, execution and evaluation of project</li> <li>• Critical appraisal of project for quality, function and finish</li> <li>• Conclusions from practical experience of project work</li> </ul> <p style="text-align: right;"><b>Subtotal</b></p>	<b>30</b>									
<b>C</b>	<b>Manipulative Skills</b> <ul style="list-style-type: none"> <li>• Skills in preparation and finishing of materials</li> <li>• Safe use of tools and machines - Hand /Power/CNC</li> <li>• Skills in assembly of materials</li> </ul> <p style="text-align: right;"><b>Subtotal</b></p>	<b>30</b>									
<b>D</b>	<b>Presentation of Project</b> <ul style="list-style-type: none"> <li>• Task completed to acceptable standard</li> <li>• Appropriate use of materials</li> <li>• Satisfactory knowledge of construction technology</li> </ul> <p style="text-align: right;"><b>Subtotal</b></p>	<b>30</b>									
<b>E</b>	<b>Experiments</b> <ul style="list-style-type: none"> <li>• Evidence of ability to plan and carry out <b>three</b> experiments</li> </ul> <p style="margin-left: 20px;"><i>Experiments should be related to the project work or selected from the suggested experiments outlined in the syllabus for Construction Studies.</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"></td> <td style="width: 40%;">Experiment 1</td> </tr> <tr> <td></td> <td>Experiment 2</td> </tr> <tr> <td></td> <td>Experiment 3</td> </tr> <tr> <td></td> <td style="text-align: right;"><b>Subtotal</b></td> </tr> </table>		Experiment 1		Experiment 2		Experiment 3		<b>Subtotal</b>	<b>30</b>	
	Experiment 1										
	Experiment 2										
	Experiment 3										
	<b>Subtotal</b>										
<b>TOTAL:</b>		<b>150</b>									

Signature of Teacher: .....

Date: .....

