

LEAVING CERTIFICATE

2014

CONSTRUCTION STUDIES

Theory – Ordinary Level | Sample Solutions

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Introduction These sample answers are designed to give the reader a sense of how the theory paper should be answered.

It is important to realise that these sample answers are different from the official solutions. The official solutions are primarily a guide for the examiners (the dedicated group of teachers who correct the Leaving Cert during the summer) and contain most of the answers that a student might come up with for a given question.

The strength of the official solutions is that they are very comprehensive and detailed. The strength of these sample answers is that they look like what a student should be aiming to achieve in the exam – they are model answers. Because the official solutions have to be more comprehensive and detailed than a typical student answer they are not always a good guide to what a student's answer should look like in the exam.

It is very important to realise that both these solutions and the official solutions were written in the year of the exam and satisfied the building regulations that applied at that time. As the regulations change, so will the answer. If you are practising a question, always check that your answer is up to date with current regulations. The building regulations can be found at www.enviro.ie.

Exam technique

Exam technique is essential to performing well in the theory paper. Put simply, this means reading the question carefully and structuring the answer so that it 'maps onto' the marking scheme. As you read through these sample answers be sure to notice how the question is phrased and how the answers are laid out to respond to the question.

Instructions to candidates

- (a) Answer **Question 1** and **three** other questions.
- (b) All questions carry equal marks.
- (c) Answers must be written in ink.
- (d) Drawings and sketches to be made in pencil.
- (e) Write the number of the question distinctly before each answer.
- (f) Neat freehand sketches to illustrate written descriptions should be made.
- (g) The name, sizes, dimensions and other necessary particulars of each material indicated must be noted on the drawings.

These 'Instructions to Candidates' appear on the front cover of the exam paper. Let's take a closer look at them:

- (a) this means that you must attempt Question 1 and any three other questions – four in total. If you do not attempt Question 1 you will only be marked out of 3 questions (i.e. max. 75%)
- (b) this means that each question is worth 50 marks
- (c) this means that you should write your answers with a blue or black pen – it's okay to write the labels to drawing questions (i.e. Q.1 & Q.5) in pencil
- (d) this means that all drawings and sketches should be done in pencil – use an H or 2H pencil for drawings (i.e. Q.1 & Q.5) and an HB or B pencil for sketches – also, use colouring pencils to add colour to your sketches where appropriate*
- (e) this means that the question number and part number should appear in the left margin beside the answer (e.g. Q.5 (b))
- (f) this means that sometimes a sketch is expected even if the question doesn't actually ask for one; so the golden rule is, if you know a sketch that goes with the topic you're writing about, put it on the page – it won't do any harm and it might pick you up some marks
- (g) this means that you should label the parts of every sketch – this is another area where you can easily lose marks – again, if you know it, put it on the page!

* Be careful with the use of colour – use colours where they have a meaning. For example, use red for damp proof layers, blue for airtight layers and yellow for insulation layers.

The only other thing to mention here is that the Construction Studies teachers who mark the exam are what you might call 'neat freaks' – they appreciate neat, accurate, well-presented work – presentation is important. So write neatly and make sure your sketches are neat, proportional and large: paper is cheap and recyclable – use it up.

Layout of the exam paper

There are nine questions on the paper. You must answer Question one and any three other questions – four in total.

There are usually two architectural drawing questions (Q.1 and Q.5). Question 8 is usually a 'terms' question where you have to explain the terms given using a note and sketch.

Before the exam

Before the exam, make sure you have everything you'll need:

- pens, pencils and colouring pencils
- eraser and sharpener
- tape/drawing clips
- T-square, set squares and compass.

When you're in the exam hall waiting for the paper to be given out, the invigilators will hand out the drawing sheets for Question 1 as soon as you are given a sheet, fix it to your drawing board/desk and get your drawing equipment ready so you can start drawing as soon as you are ready.

Timing

Try to stick to this timing:

- 5 minutes to choose which questions to answer
- 35 minutes to answer each question
- 5 minutes to read over and check your answers and add any last-minute details.

so it's...

- 2:00p.m. choose questions
- 2:05p.m. begin Q.1.
- 2:40p.m. next question
- 3:15p.m. next question
- 3:50p.m. next question
- 4:25p.m. look over
- 4:30p.m. finish

Choosing which questions to answer

Taking time at the beginning of the exam to choose your questions is very important. Start by having a look through the paper to get a sense of what's there. Pick your three questions (plus Q.1), then carefully read through these questions to make sure you can answer all parts of the question. Don't just choose a question because you can see at a glance that it's about a topic you like – actually read the full question and make sure you can answer **every** part of it in full.

Answering questions in the best order

Begin with Q.1 (remember, it's compulsory). Then, if you are going to do another drawing question (Q.5), do it next while you have all your drawing equipment out.

After that, do the remaining questions in order of strength – that is, do the question you think you'll do best next and so on, leaving your weakest question until last. Doing it this way will give you confidence and keep you in a positive frame of mind.

Structuring your answers

Once you have selected your four questions, get out your highlighter marker and highlight the key parts of each question.

Take Q.7 from the 2014 paper as an example:

- 7 A two-storey house with a slated roof is shown in the sketch. It has been decided to collect and store the water for re-use.
- Using **notes** and **freehand sketches**, show how the rainwater could be collected from the roof and stored for re-use.
 - List **two advantages** of storing rainwater and suggest **two suitable uses** for the stored rainwater.
 - Discuss **one advantage** and **one disadvantage** of fitting a water meter to the mains water supply of a dwelling house.



Part (a) of this question asks for 'notes **and** freehand sketches', so your answer must include a separate note and freehand sketch.

Part (b) of the question is asking about two separate areas:

- two advantages of storing rainwater, and
- two ways stored rainwater can be used

So your answer must have **four** separate notes!

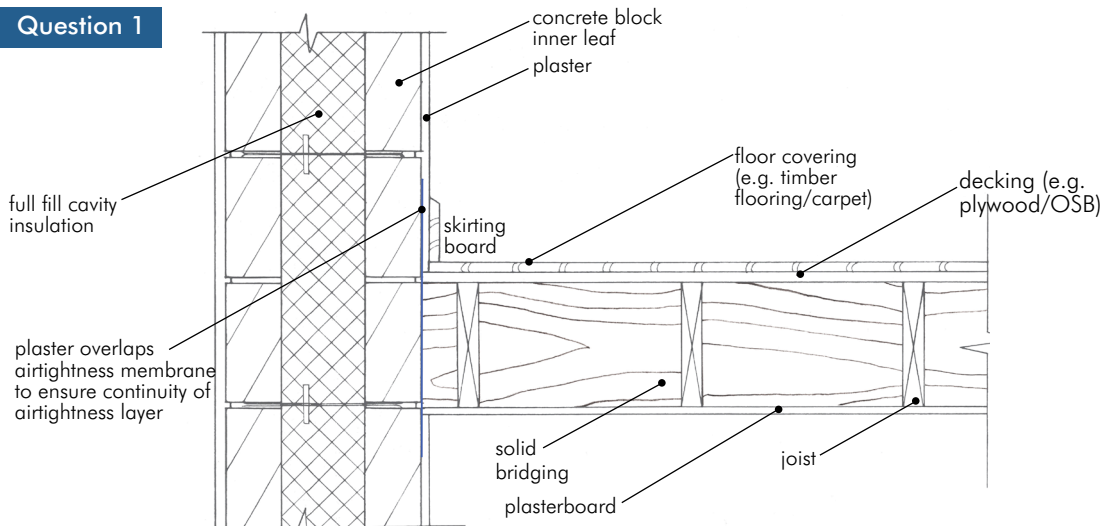
Part (c) asks for one advantage and one disadvantage so your answer must have **two** separate notes!

In summary, your answer should have:

- part (a): one note and one sketch,
- part (b): four notes,
- part (c): two notes.

It is really important that you get used to carefully checking every question to make sure how many parts your answers should have if you are going to do your best in the exam.

Question 1



Question 2

(a)

Fixing external insulation to solid block wall:

- prepare the surface of the wall by brushing off any loose dirt or debris
- remove and replace any loose render
- remove any projecting mortar or concrete parts (e.g. cut window sills and back flush with wall surface)
- the starter track is screwed to the base of the wall, level with the dpc line
- a coat of adhesive is applied to the surface of the wall using a notched trowel
- the insulation board is pressed firmly into place
- mechanical fixings (e.g. long plastic anchors) are used to secure the boards in place
- the number of anchors per square metre depends on the insulation used
- expanded polystyrene (EPS) needs 4 per m², mineral wool needs 8 to 12 per m².
- the boards are placed so that the vertical joints are staggered
- the boards should be butted firmly up against each other
- gaps up to 5mm can be filled with a foam filler.

(b)

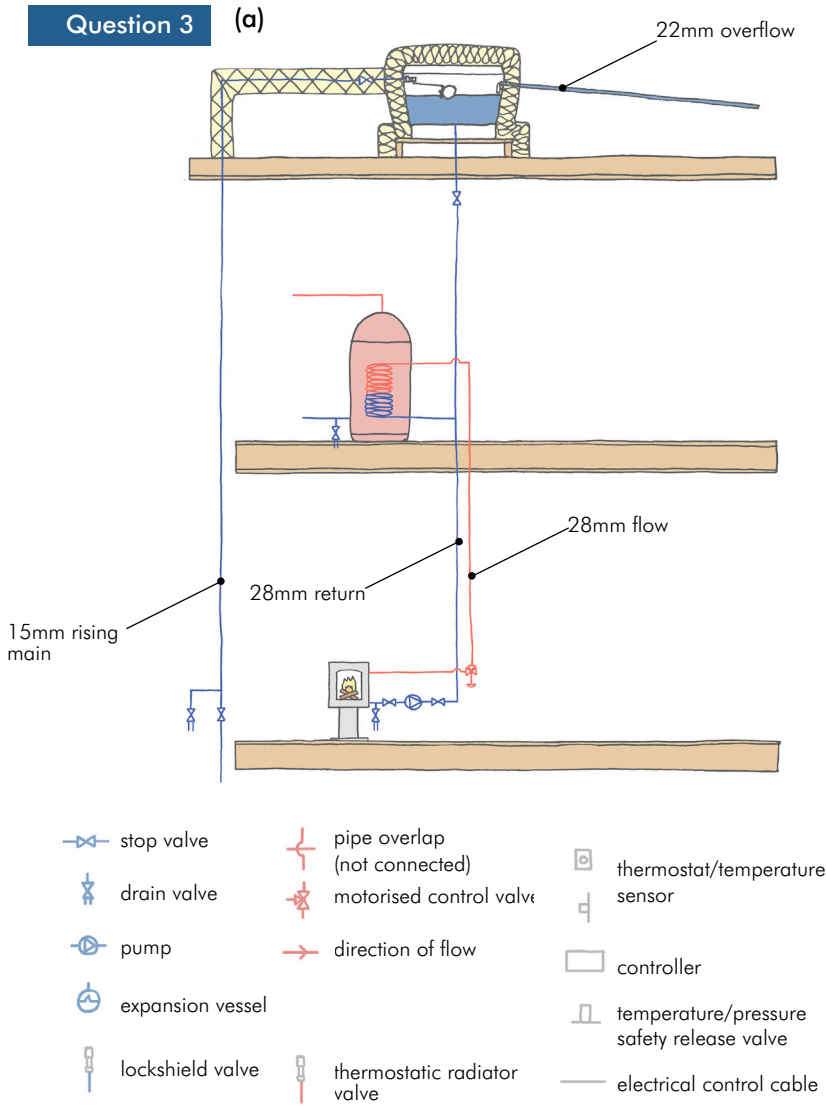
- the base coat is applied using a toothed trowel to a depth of 2/3 of the final thickness
- the reinforcing mesh is then pressed into the wet base coat until it is no longer visible
- the final one third of the base coat is then applied and allowed to dry/cure this can take up to 3 days
- a primer or sealer is then applied and allowed to dry for at least 12 hours
- the finish coat is then applied using a smooth trowel and allowed to dry/cure
- work should only be carried out during good weather – renders must only be applied when temperatures are between 5°C and 25°C and overnight temperatures should not fall below 0°C in the 72 hours after renders have been applied.

(c)

Two advantages of insulating the external wall are:

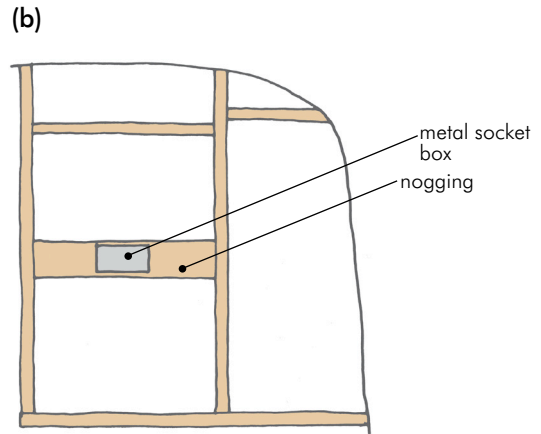
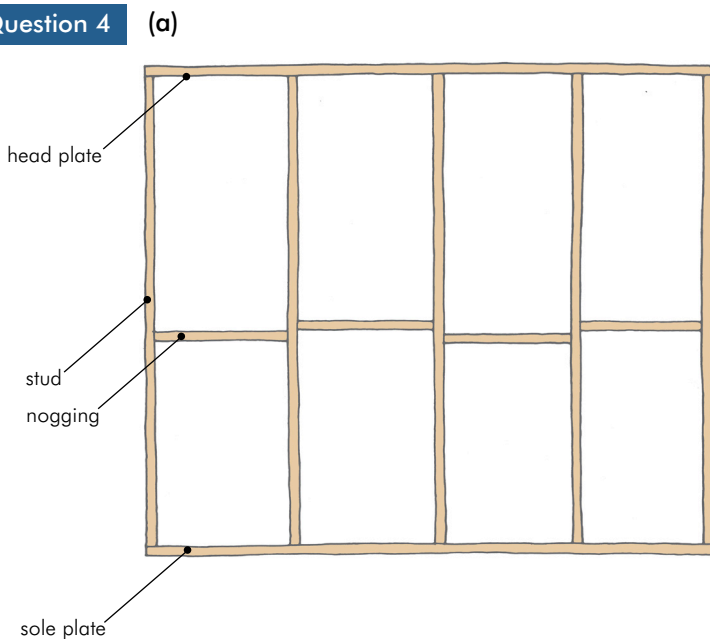
- 1 less energy will be need to heat the home, so the home owner will save money on lower heating bills
- 2 less energy being used means less carbon dioxide emissions – this is good for the environment.

Question 3

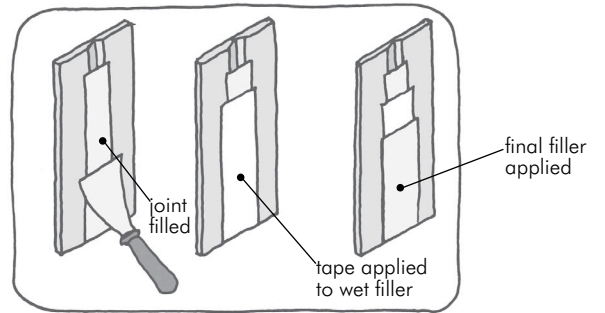


- (b)
- Two advantages of adding a solar panel are:
- 1 solar energy is free so the home owner will save money on heating bills
 - 2 less oil, gas or coal will need to be burned to heat the water, so there will be lower carbon dioxide emissions – this is good for the environment.

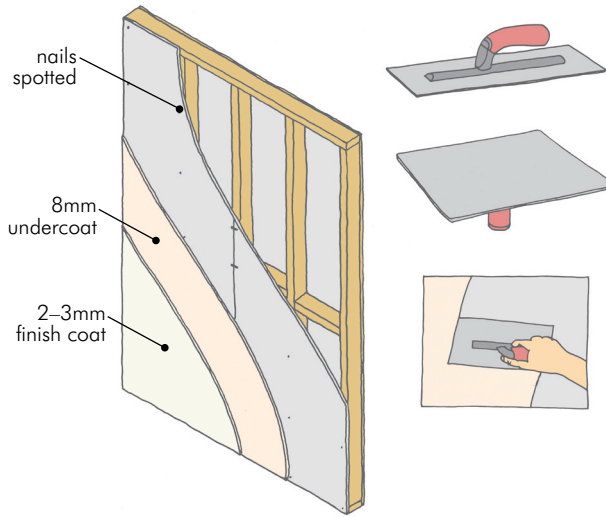
Question 4



- (c)
- Applying a plaster skim finish:
- reinforce all joints with reinforcing joint tape or jointing materials and allow to set
 - dampen the surface slightly with clean water
 - add the appropriate amount of water to a clean bucket



- mix the plaster by adding the plaster to the water
- use a power or hand mixer to mix the plaster
- mix the powder and water thoroughly until the mixture is free from lumps
- pour the plaster on to a mortar board.



- using a clean trowel, apply a 1 mm coat of plaster
- after a short period of time apply, a second coat of plaster while the first coat is still wet to bring the total thickness to 2mm
- as the plaster is stiffening, trowel in two or three steps to a smooth matte finish.

High visibility vests are worn to ensure that plant operators (e.g. crane drivers) can see workers on site.

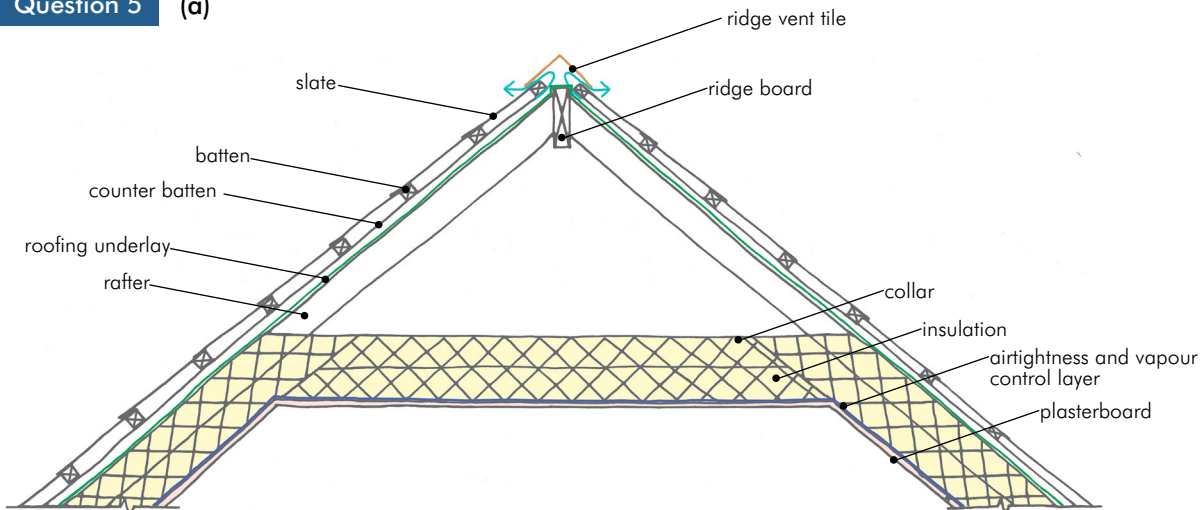
Safety boots have a steel insert that protect the worker's toes. For example, if a heavy object falls on a worker's toes the boots will prevent the toes from being injured.

c

The site manager must know when visitors are on site so that:

- their details can be recorded in the visitor's log
- they can be given personal protective equipment (e.g. safety helmet, etc.)
- they can be told about the particular safety requirements of the site
- they can be assigned a guide to escort them safely around the site.

Question 5 (a)



(b)
The roofing underlay is breathable so there is no need to install vents in the roof space. The slate battens are fixed to counter battens – this creates space for air flow under the slates.

Question 6 (a)

Mandatory personal protective equipment signs for safety helmet, high visibility vest and safety boots:

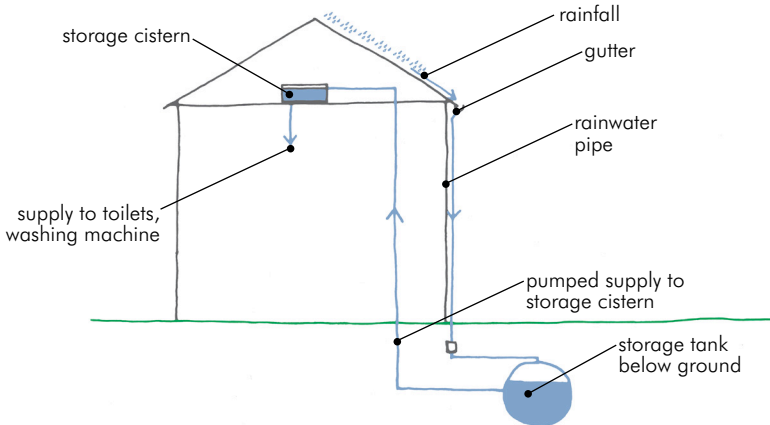


(b)
Safety helmets must be worn because they protect the worker's head from falling objects, for example, if a concrete block fell from a scaffold deck.

Question 7

(a)

Collection and storage of rainwater for reuse. The rainwater flows from the sloped roof, collects in the gutter and flows down the rainwater pipe. It passes through a screen filter to remove leaves and any other waste. The rainwater then collects in a storage tank that has been installed below ground. The tank contains a controlled pump that feeds the water up to a storage cistern in the attic. This cistern supplies water to the toilets, washing machine and outside tap. Rainwater is not used for drinking or personal hygiene (e.g. showering).



(b)

Two advantages of storing rainwater are:

- 1 it reduces demand for water supplied from the mains/well – water is a valuable resource and should be conserved
- 2 it reduces the cost of water bills.

Two suitable uses for the stored rainwater, are:

- 1 rainwater can be used in washing machines for washing clothes
- 2 rainwater can be used for outdoor activities like washing the car and watering the garden.

(c)

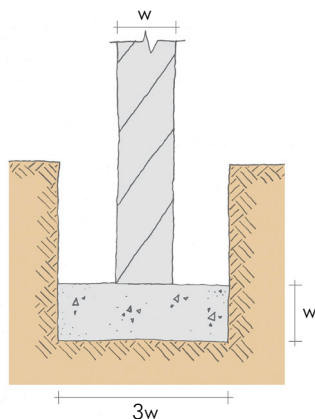
Fitting a water meter:

Advantage: fitting a water meter makes people more aware of the amount of water they are using – this usually leads to a reduction in the amount of water used by the household.

Disadvantage: fitting a water meter is disruptive to the household – the water supply must be cut off for a few hours while the meter is being fitted.

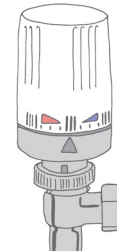
Question 8

Strip foundation:



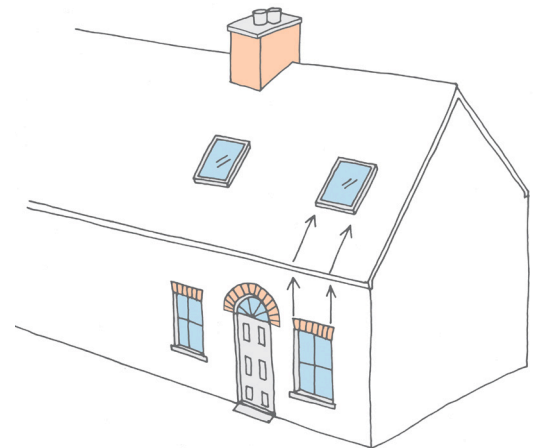
A strip foundation is a trench filled with concrete that is used to support the load-bearing walls of a house. Steel reinforcement is usually placed in the trench before the concrete is poured. A strip foundation is used when the soil has a good load-bearing capacity. The strip provides a secure, level surface for the construction of the walls.

Thermostatic valve:



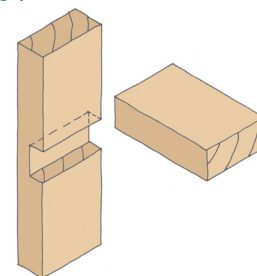
A thermostatic valve is fitted to a radiator to regulate the flow of hot water into the radiator. This controls the temperature of the radiator. It allows the user to adjust the temperature of a room to suit the people in the room. Controlling the temperature reduces energy consumption and carbon dioxide emissions.

Roof light window:

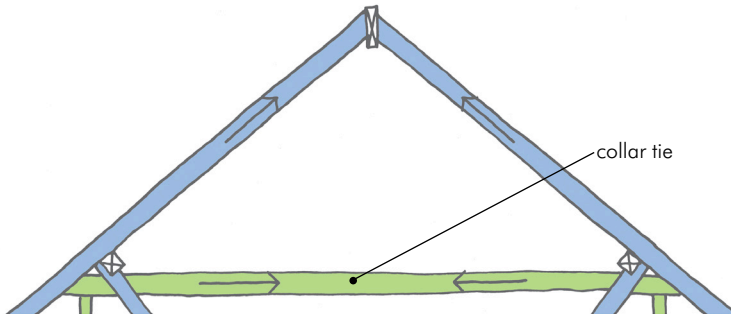


A roof light window is a window installed in the slope of a roof to allow light into a roof space room (e.g. bedroom). Roof light windows are less obtrusive than dormer windows and can be used to convert the attic space of heritage buildings when it is important not to impact the external appearance of the building.

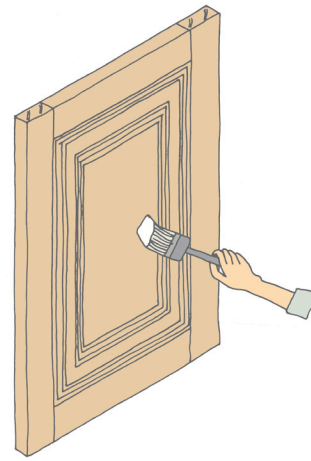
Housing joint:



A housing joint is used to join two pieces of timber. A trench is created in one piece of timber and the other piece of timber slots into the trench. When it is glued it is a simple, strong joint that can be used in cabinet making (e.g. storage presses, chests of drawers).

Collar tie:

A collar tie is a component of a traditional cut roof. It spans across the roof at the midpoint of the rafters to prevent the rafters from spreading. This provides triangulation to the roof, making it structurally stable and capable of withstanding loading (e.g. weight of roof slates, wind load, etc.).

**(b)**

Applying a high-quality paint finish to a cabinet door

- the surface is cleaned and sanded using fine sand/ glass paper – hand or machine
- the dust is then removed using a clean cloth dampened with a solvent (e.g. white spirits)
- using a good-quality brush, a coat of primer is applied to the door surface and allowed to dry
- the surface is then given a light sanding
- the dust is removed using a clean cloth dampened with a solvent (e.g. white spirits)
- suitable undercoat is then applied and allowed to dry fully
- the surface is very lightly sanded
- the final coat is applied.

(c)**Granite worktop:**

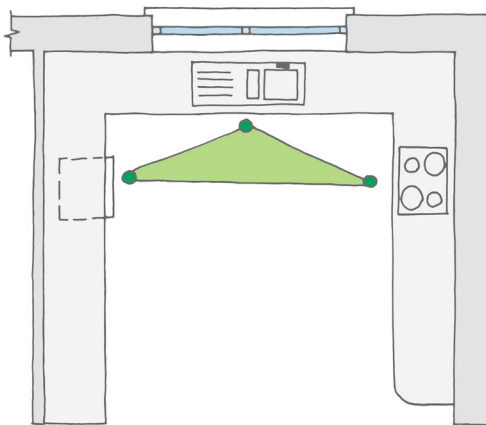
- **advantage:** a hardwearing and low maintenance worktop that is easy to clean
- **disadvantage:** granite is a very expensive material with a high embodied energy (i.e. lots of energy is used mining, cutting, polishing and transporting the granite).

Solid wood worktop:

- **advantage:** wood is an affordable, sustainable material with a low embodied energy
- **disadvantage:** wood is not as hardwearing as stone and will require maintenance over time.

Note: I recommend the use of a wooden worktop because:

- it is a natural, attractive material that will add to the appearance of the kitchen
- compared to granite, it is cheaper and easier to install.

Question 9**(a)**

The sink, cooker and fridge should be located in a triangular pattern to allow the user to move easily between them without having to walk a long distance (i.e. less than 3 metres). This makes it more convenient and efficient to work in the kitchen (e.g. prepare a meal).

Sink:

- located under the window for maximum natural light
- allows someone washing kitchen ware to see clearly if something is clean (e.g. hold a glass up to the light)
- gives a view of the garden when working at the sink.

Cooker:

- located on the wall so the steam rising from the pots and pans doesn't fog up the window
- located close to the sink so that the sink is within easy reach while cooking (e.g. filling pots with water, straining off water from pots)
- there is enough worktop space either side of the hob
- located on the external wall so an extractor fan can be fitted above the cooker.

Fridge:

- located close to both the sink and the cooker
- not beside the cooker because both appliances produce heat
- worktop provides space for putting away groceries.