BTEC CONSTRUCTION AND THE BUILT ENVIRONMENT

UNIT 1 CONSTRUCTION TECHNOLOGY

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need*.

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.

PEARSONS

BTEC Level1/ Level 2 First Award

[Type the sidebar content. A sidebar is a standalone supplement to the main document. It is often aligned on the left or right of the page, or located at the top or bottom. Use the Drawing Tools tab to change the formatting of the sidebar text box.]

Identify **two** preconstruction stage legal requirements.

A Informing the Health and Safety Executive (HSE)
B Reduction in construction wastage
C Prefabrication of elements
D Designing for functionality
E Risk assessments

(Total for Question 1 = 2 marks)

2 The installation of site accommodation is a site-based preconstruction activity carried out at the set-up stage.

Name **two** other site set-up activities required before construction work begins.

1
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2
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(Total for Question 2 = 2 marks)

3 (a) Identify **two** fire-resistant materials. (2)
A Plasterboard
B Blockwork
C Bitumen
D Timber
E Straw

(b) Buildings are insulated in order to reduce heat loss.

Identify **two** locations where thermal insulation may be installed. **(2)**
1
.....

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2
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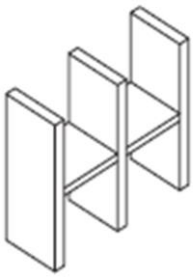
- Check your answers if you have time at the end.

CONTEXT : IDENTIFY

The diagram shows a structural form used in the construction of low-rise buildings. **(1)**
Identify this structural form.



A Internal partitions
B Timber frame
C Cavity wall
D Cross-wall

Name **two** types of pointing used in facing brickwork.
1 .....
.....
2 .....
.....
(Total for Question = 2 marks)

There are many hazards associated with sub-structure groundwork activities, such as damaging existing underground services.
Identify **two** other hazards associated with sub-structure ground works. **(2)**
1 .....
.....
2 .....
.....

To enable construction work to start, existing services need to be located and protected.
Explain **two** ways to locate existing underground electric cables. **(4)**
1 .....
.....
2 .....
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Name **one** method used to permanently control sub-soil water. (1)
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.....
.....

TIPS FOR TOP MARKS **(10 MARKS)**

Accept any appropriate answers.

CONTEXT: LABELLING

Diagram 1 shows a sub-structure detail of a suspended timber ground floor.

Label the components of the suspended timber ground floor shown in Diagram 1.

Diagram 1
(Total for Question 6 = 4 marks)

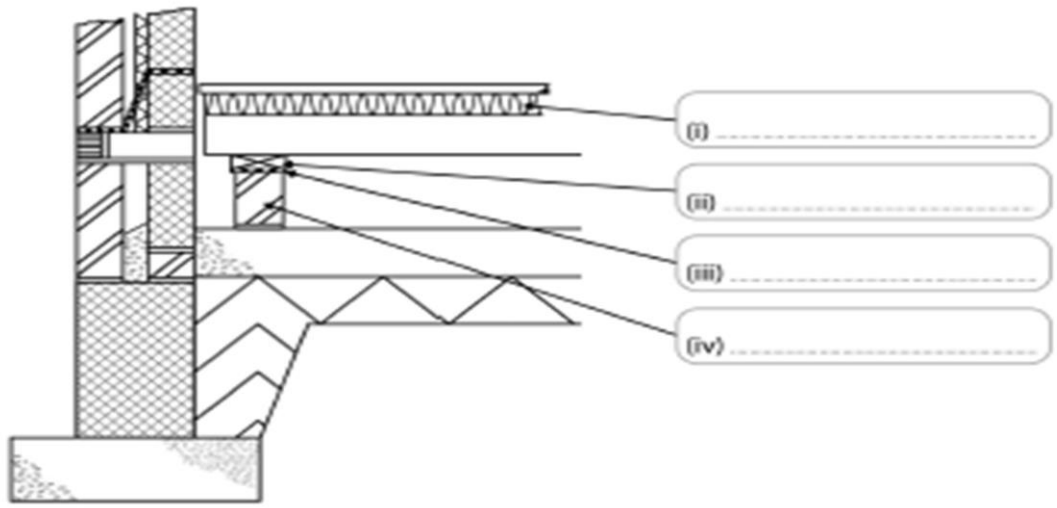

Diagram 1

(Total for Question 6 = 4 marks)

One purpose of sound insulation is to resist the passage of sound through a building.

Identify **two** other purposes of sound insulation for a building. **(2)**

1 .....

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2 .....

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Describe **one** benefit of using sheep's wool in construction projects. **(2)**

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TIPS FOR TOP MARKS **(4 MARKS)**

Accept no variations

CONTEXT : DRAW

Sketch a diagram of a cross section through a timber flat roof construction form.
You should annotate your diagram.

Accept fill patterns in place of annotation – one mark for each label or fill pattern:
1 mark for stone chippings/solar reflective paint
1 mark for three layer built up roofing felt/single ply membrane
1 mark for decking
1 mark for firring (piece)/laser cut insulation
1 mark for joist (falls could also be achieved by sloping joists, tapered joists, firrings across the joist run and reducing firrings)
1 mark for insulation /fill pattern
1 mark for vapour barrier/fill pattern
1 mark for plasterboard
1 mark for soffit
1 mark for fascia/verge
1 mark for wall plate
1 mark for holding down strap
1 mark for drip
1 mark for waterstop/watercheck
1 mark for triangular

CONTEXT : SUSTAINABILITY

A low-rise building project is taking place on a brownfield site.

(a) Explain **one** benefit to the environment of recycling the bricks from the brownfield site as hardcore for the new building. **(2)**

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(b) Define the term embodied energy. **(1)**

.....

.....

(c) Explain **one** way in which each of the methods below can contribute towards a building's sustainability. **(4)**

Building orientation

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Prefabricated elements

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.....

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TIPS FOR TOP MARKS (4 MARKS

ACCEPT ANY OTHER APPROPRIATE UP TO A MAXIMUM OF FOUR MARKS.

CONTEXT : BUILDING MATERIALS / STUD WALLS

Explain **two** reasons why high-density blockwork is used in walls where sound insulation is required.

1

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2

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(Total for Question = 4 marks)

Sections of a new build office building will be rented to different businesses.

The internal partitions will be constructed using metal studs.

Explain **two** reasons why metal studs are suitable for this office building.

1

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2

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(Total for Question 10 = 4 marks)

CONTEXT : WRITTEN EXAM QUESTION : EVALUATE

ABC Housing Developments currently uses a traditional brick cavity wall structural form for all its housing projects. It is experiencing an increase in demand for its homes and would like to respond quickly. *ABC Housing Developments* is considering changing the structural form of its housing to timber frame construction.

Evaluate whether this change of structural form is the best way for *ABC Housing Developments* to meet the increase in demand quickly.

(Total for Question = 8 marks)

TIPS FOR TOP MARKS (8 MARKS)

0 marks – Not Attempted
1-3 marks - Basic arguments on both sides identified, or only one side considered.
4-6 marks - Arguments for and against are described, but there will be more emphasis on one side than the other. The answer will be unbalanced.
7-8 marks - the majority of points made will be relevant and there will be a clear link to the situation

CONTEXT : PERFORMANCE REQUIREMENTS

Low-rise buildings have particular performance requirements.

(a) Match the material to its performance requirement for low-rise buildings. (2)

Draw a straight line to match each material to its associated performance requirement.

Each material has only **one** performance requirement.

Material	Performance requirement
	Strength
Flashings	Thermal insulation
	Stability
Sheep's wool	Security
	Weather resistance

(Complete the sentence about slump tests.

Put a cross in **one** box to indicate your answer.

A slump test is used to measure a property of: **(1)**
A steel
B concrete
C mortar
D hardcore

c) Complete the sentence about stress grading. Put a cross in **one** box to indicate your answer.
Stress grading indicates the strength of: **(1)**
A mortar
B blocks
C bricks
D timber

TIPS FOR TOP MARKS (3 MARKS)

Accept only the correct answer / no variations

CONTEXT : EARTH WORKS

a) Identify **two** temporary earthwork support methods used to prevent the collapse of the sides of an excavation.

Put a cross in **two** boxes to indicate your answers. **(2)**

A Joists
B Wall-tie spacing
C Timbering
D Steel trench sheets
E Skirtings

(b) Identify **one** method used for the temporary control of surface water in excavations. **(1)**

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.....

(Total for Question 2 = 3 marks)

Before construction works start, activities will take place in the office (desk-based) and on site (site-based).

Match the type of preconstruction work to its activity.
Draw a straight line to match each type of preconstruction work to the appropriate activity.

Each type of preconstruction work has only **one** activity.

Type of preconstruction work	Activity
	Scaled site layout plan
	Excavation for foundations
Desk-based preconstruction	Engineering brickwork to dpc
Site-based preconstruction	Gates and security of the site
	Fix wall plates

(Total for Question 3 = 2 marks)

CONTEXT : FUNCTION OF A WALL

One function of a wall is to reduce sound transmission.
Identify **two** other functions of a wall. **(2)**

1
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2
.....

.....

(b) Outline the function of a lintel.
(1)

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.....

(c) Identify **two** types of wall finishes that could be used on a building.
Put a cross in **two** boxes to indicate your answers. **(2)**

A Metal stud
B Rendered blockwork
C Bitumen felt
D Facing brickwork
E Mineral wool

(Total for Question 4 = 5 marks)

Q5 *XYZ Homes* is a building contractor.
During the excavation of foundations on a large housing development site an *XYZ Homes* employee cut into an underground power cable.
Explain **two** measures that *XYZ Homes* could have put in place to reduce the risk of damaging underground power cables.

1
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2
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(Total for Question 5 = 4 marks)

CONTEXT: SKETCH A ROOF STRUCTURE

6 There are several components of a roof structure.

(a) Label the components of the roof structure shown in Diagram 1.

(4)

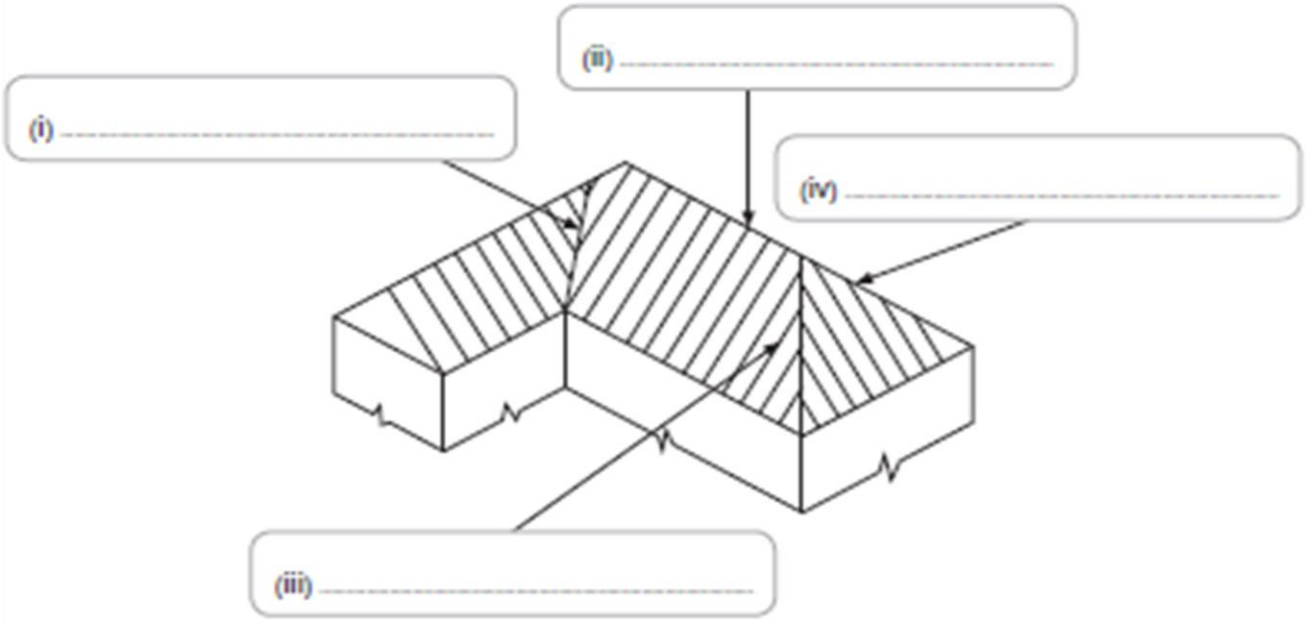

Diagram 1

(b) Trussed rafters are used in house construction.

Identify the material used to manufacture trussed rafters.

Put a cross ☒ in **one** box to indicate your answer.

(1)

- ☐ **A** Plywood
- ☐ **B** Softwood
- ☐ **C** Hardwood
- ☐ **D** Chipboard

(Total for Question 6 = 5 marks)

TIPS FOR TOP MARKS (5 MARKS)

Accept only the correct answer / no variations

CONTEXT : SKETCH

Sketch a diagram of a cross section through a solid ground floor.
You should annotate your diagram.

CONTEXT : FLOORING

Solid ground floors are often used in low-rise buildings as they can be constructed in a short period of time.
Explain **two** other advantages of a solid ground floor in a low rise-building.

1

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2

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(Total for Question 8 = 4 marks)

Engineered timber joists are often used in the construction of the upper floors of low-rise buildings.
Explain **two** benefits of using engineered timber joists in the construction of the upper floors of low-rise buildings.

1

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2

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(Total for Question 9 = 4 marks)

10 Explain **one** reason why timber frame housing is a sustainable form of construction.

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(Total for Question 10 = 2 marks)

CONTEXT : WRITTEN EXAM QUESTION

A property developer has two design options to build a new housing development in an inner city area. One design option is to build on local parkland, which is a greenfield site. The other design option is to build on a site previously used for industry, which is a brownfield site.
Discuss whether the property developer should build on the greenfield site or the brownfield site.

TIPS FOR TOP MARKS (8 MARKS)

0 marks – Not Attempted
1-3 marks - Basic arguments on both sides identified, or only one side considered.
4-6 marks - Arguments for and against are described, but there will be more emphasis on one side than the other. The answer will be unbalanced.
7-8 marks - the majority of points made will be relevant and there will be a clear link to the situation

Many functional elements contribute to making a building safe, secure, sustainable and comfortable.

(a) Match the property to how it is achieved in a low-rise building.

(2)

Draw a line to match each property to how it is achieved.

Property	How it is achieved
Stability	Developing a brownfield site
	Provision of ventilation
	Construction of a suitable foundation
Sustainability	Developing a greenfield site
	Provision of artificial light

(b) Complete the sentence about U-values below.

A U-value is a measure of:

(1)

- ☐ **A** heat loss from a building
- ☐ **B** load transfer within a building
- ☐ **C** fire resistance in a building
- ☐ **D** sound resistance in a building.

Outline two methods of making sure windows can resist the weather.

(2)

1 .....

.....

2 .....

.....

(d) Identify **two** construction methods used to slow down the spread of fire in a building.

(2)

A Compartments
B Wet Risers
C Barriers
D Smoke Detectors
E Fire Alarms

(e) In the UK, which is the best direction for a building to face to make the most use of natural light?

(1)

A North
B South
C East
D West

A scaled site layout plan is used to plan the preparation required on site prior to work starting.
Name **two** welfare facilities that should be shown on the scaled site layout plan.
1
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.....

2
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.....

(Total for Question 2 = 2 marks)

What is the name given to the foundation shown in the cross section in Diagram_1?

(1)

A Deep strip
B Mass fill
C Strip
D Raft

Timber-framed construction uses a secondary finish which is applied to the outside of the panels.

Give **one** secondary finish which keeps out the weather.

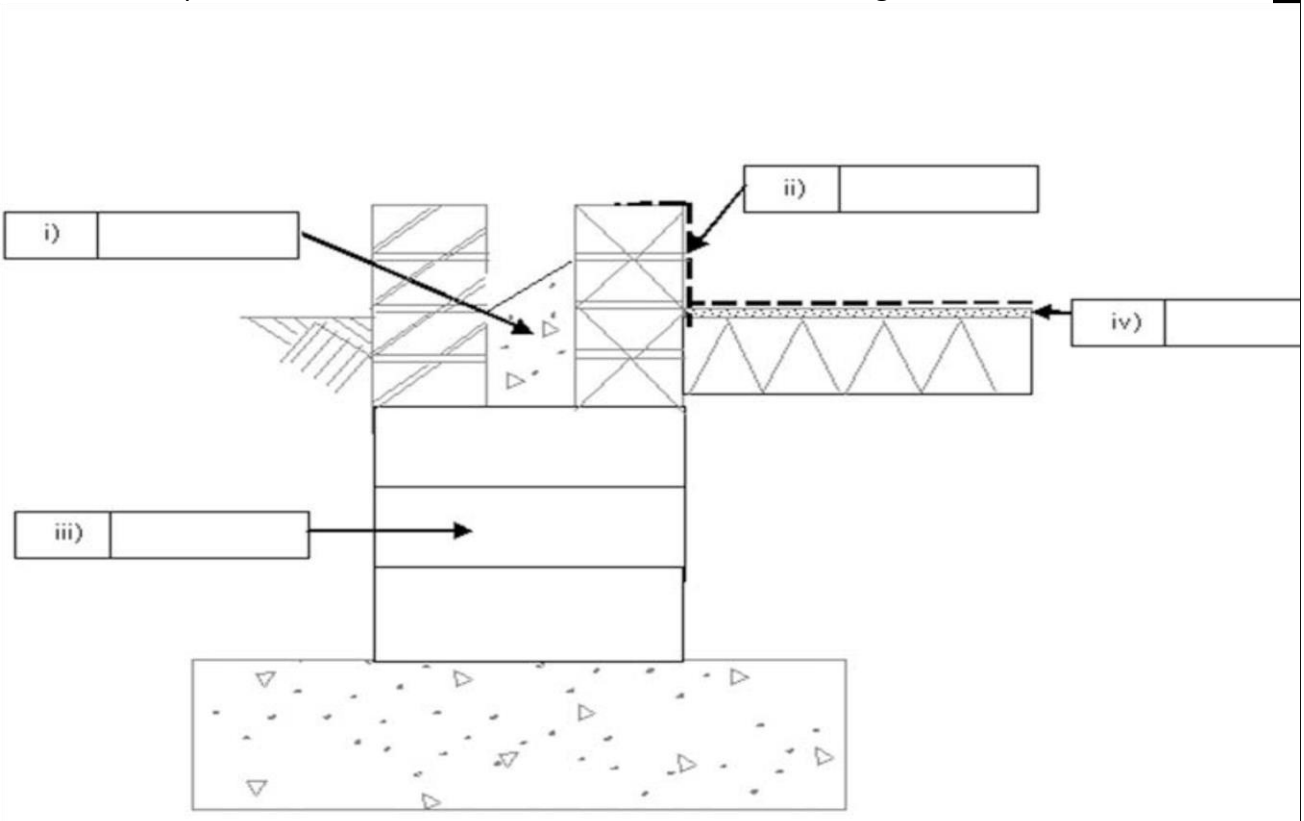
.....

(Total for Question= 1 mark)

CONTEXT : LABELLING

A substructure design engineer needs to identify the component parts of a foundation drawing.

(a) Label the components of the foundation cross section shown in Diagram 1.



An architect is designing a house and is considering two types of floor.

(a) Explain **two** advantages of using a beam and block floor instead of a solid floor.

(4)

1

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.....

2

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.....

CONTEXT: SKETCH A LOW-RISE STRUCTURE

Sketch a diagram of a cross section through an external masonry cavity wall.
You should annotate your diagram.

TIPS FOR TOP MARKS (4 MARKS)

Accept fill patterns in place of annotation 1 mark for each label or fill pattern:
1 mark for brickwork labelled/fill pattern.
1 mark for blockwork labelled/fill pattern
1 mark for cavity/insulation labelled/fill pattern
1 mark for wall tie labelled/fill pattern

CONTEXT: DPM/ SIPS

Explain how the installation of a damp-proof membrane prevents moisture transfer in solid floor construction.

(2)

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.....

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.....

(Total for Question = 1mark)

Give **two** functions of a foundation.

1 .....

.....

2 .....

.....

(Total for Question 7 = 2 marks)

8 The use of structural insulated panels (SIPs) is a modern method of construction.
Explain **two** reasons why SIPs are more sustainable than cavity wall construction.

1 .....

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2 .....

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(Total for Question 8 = 4 marks)

The excavation of a substructure for a foundation has a number of hazards associated with it.
(a) Complete the table to show the missing hazard and the missing associated risk for this type of excavation.

Hazard	Associated risk
Collapse of the sides of the excavation	Severe injury or fatality to workers
	Flooding and potential drowning
Gas	

CONTEXT: EXCAVATIONS

Explain **two** control measures used to prevent the collapse of the sides of the excavation.

(4)

1 .....

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2 .....

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(Total for Question 9 = 6 marks)

A client has commissioned an architect to design a house in a location with high rainfall and high wind speeds.
Explain **two** appropriate specifications for the external cavity wall.

1 .....

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2 .....

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(Total for Question 10 = 4 marks)

TIPS FOR TOP MARKS (4 MARKS)

121212
12321
22324
3434543

CONTEXT: **WRITTEN EXAM QUESTION**

Evaluate whether a flat roof or a pitched roof would be more appropriate for an office scheme.

(Total for Question 11 = 8 marks)

TIPS FOR TOP MARKS (8 MARKS)

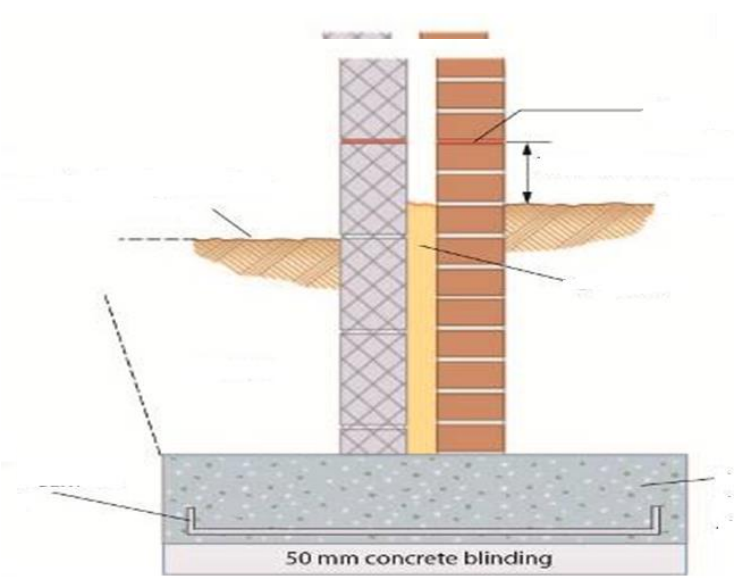
0 marks – Not Attempted

1-3 marks - Basic arguments on both sides identified, or only one side considered.

4-6 marks - Arguments for and against are described, but there will be more emphasis on one side than the other. The answer will be unbalanced.

7-8 marks - the majority of points made will be relevant and there will be a clear link to the situation

Add the key words on to the drawing below



- ✓ Damp proof course
- ✓ Minimum 150mm
- ✓ Ground level
- ✓ Cavity fill
- ✓ Concrete strip foundation
- ✓ Mild steel reinforcement transverse bars
- ✓ Back fill
- ✓ Excavation level to receive concrete floor slab

What is the purpose of a foundation?

_____

What are the three families of foundations? And where would you use them? Pg 23

1. *Type of foundation:*_____
   Where could you find them?
   _____
2. *Type of foundation:*_____
   Where could you find them?
   _____
3. *Type of foundation:*_____
   Where could you find them?
   _____

There are four types of foundations, what are they? See page 22

*1.S*_____
2Mass _____
*3 R*_____
*4 S*_____ _____ _____

What are the advantages of each foundation?

*1*_____

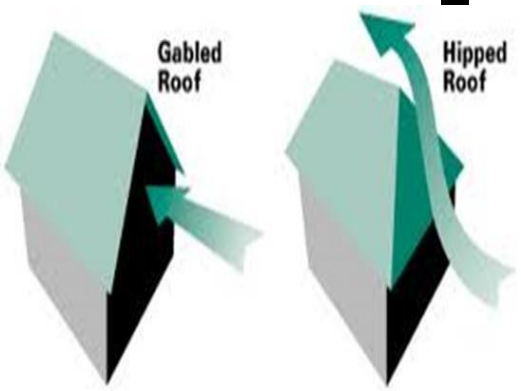
*2*_____

*3*_____

*4*_____

CONTEXT: DRAWING TECHNIQUES

Re draw a double pitch roof

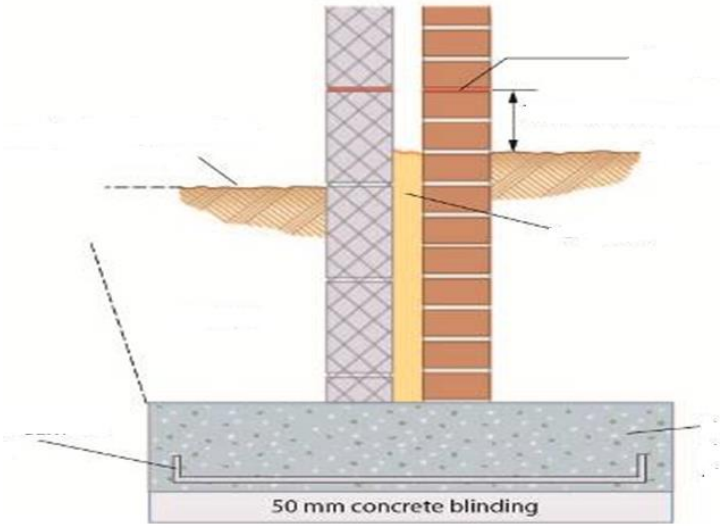


Two Point Perspective Drawing

When completing ground works
What are the hazards involved in digging out a foundations when completing ground works *See Page 20.*
1
2
3
4
5
6

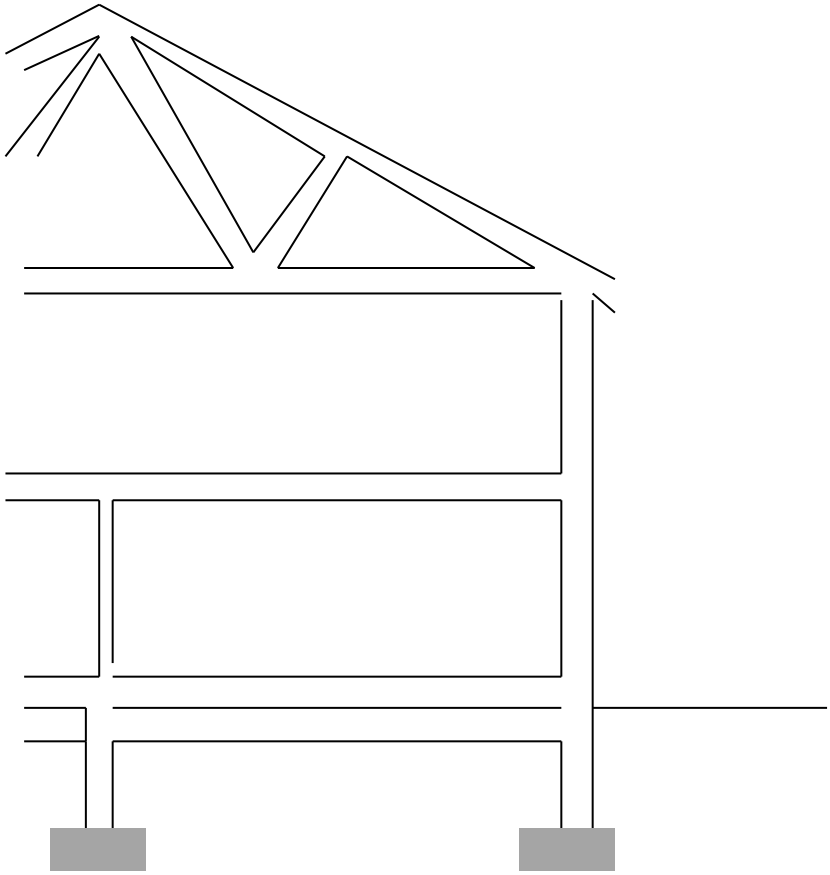
Understand the structural performance required for low-rise construction

Revisit last lesson Label the foundation below



Introduction to ***structural performance***

Below is a drawing of a normal house please draw arrows where you feel the load is allocated around the building.



Understand the structural performance required for low-rise construction

1 What is the difference between a solid and suspended ground floor?

_____

_____

2. What does dpm stand for? What is its function?

_____

_____

3 What does dpc stand for? What is its function?

_____

_____

What equipment does a building require in order to prevent the spread of a fire?

1
2
3

4
5

What are the 4 main fire-resistant materials?

1
2
3
4

What is thermal resistance? Pg 10

_____

What does the U Value measure?

_____

WHAT IS THE FUNCTION OF THE FOLLOWING ? Pg 7-9

1. **FIRE BARRIER**

_____

2. **SPRINKLER SYSTEM**

_____

CONTEXT: STRUCTURAL PERFORMANCE

Name as many items that can be used for insulation

_____

Name the types of sustainable insulation

_____

What are the two tests for concrete?

_____

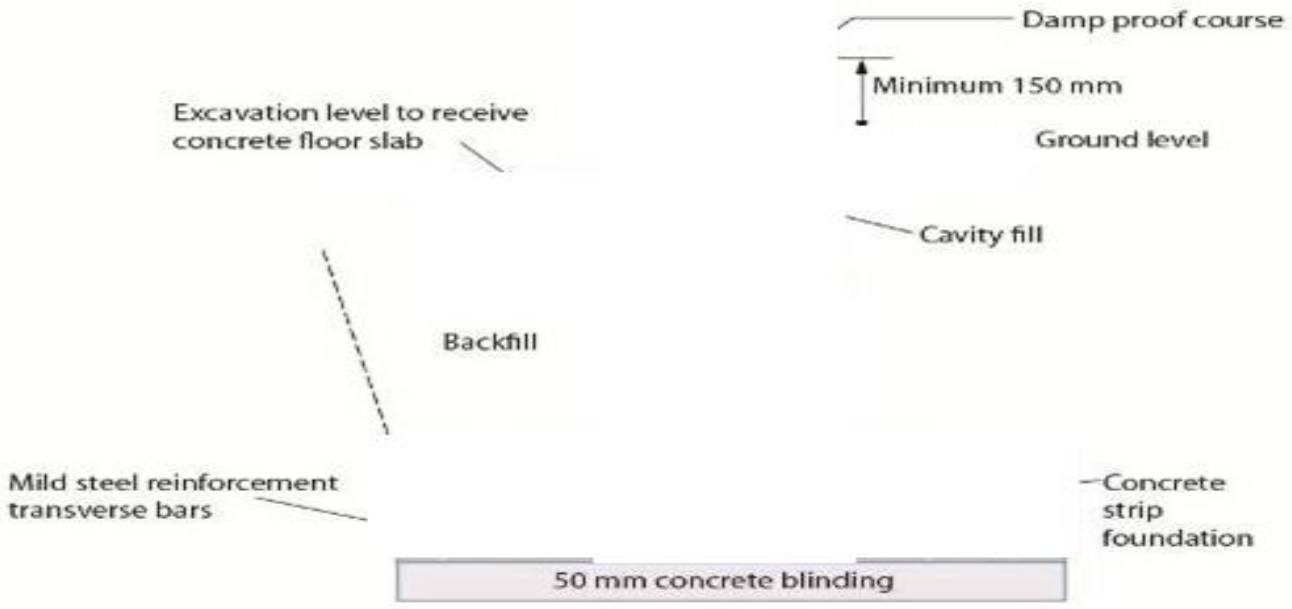
What does BS stand for

_____

Why are wall ties provided:

_____

Revisit PREVIOUS DRAWINGS AND Label the foundation below



The transfer of loads to foundation can be classified as L_____, D_____, D_____

The roof could be classified as a _____ Load. Snow could be classified as a _____

People walking in the buildings can be classified as a _____ load.

Houses are build in a way to protect people from the weather.

Identify five purposes of weather resistance. 1. _____ 2_____ 3_____

4_____ 5_____

*Identify six applications of **materials** on a building thet will improve the weather resistance*

1._____ 2_____ 3_____ 4_____

5_____ 6 _____

Identify six places where on a building weather resistance can be achieved. 1. _____2. _____ 3_____4_____ 5 _____ 6 _____

Common structural forms

What is a Cavity wall construction?

What is a Cross-wall construction?

What is a Panel and cladding systems?

What is a Timber-framed construction?

Site layout plan

Site layout plans are vital parts of preconstruction planning.
They can help you to spot any potential issues or hazards.

Produce a site layout plan indicating:

- accommodation
- compounds
- fixed plant
- fire precaution measures.

- site accommodation
- welfare facilities
- storage
- temporary roads or hard standing

What Do the following words mean ?

Strength and stability pg4	Key information
Stable	Key information
sustainability	Key information
Ratio pg5	Key information
British standards	Key information
Coniferous pg6	Key information
Deciduous pg6	Key information

Hard-core pg6	Key information
Aggregate pg6	Key information

Revision Page 7-9

Construction and the built

Pg 7 Draw a cavity wall

What are the 4 main fire-resistant materials

In_____

PAINT pg8

Key information

NAME THE EQUIPMENT FOR FIRE RESISTANCE

1
2
3
4

What is thermal insulation?

What does the U Value measure?

What is thermal resistance pg 10

Name the types of insulation

Name as many items that can be used for insulation

SUMMERY

Key information Page 7

Timber classified as C45 is :

Wall ties are provided:

WHAT IS THE FUNCTION OF THE

1. FIRE BARRIER

2. SPRINKLER SYSTEM

What does BS stand for?

What are the two tests for concrete?

How is the strength of a material calculated?

Revision Page 19-28

Construction and the built

Before work starts on site you need to pg19

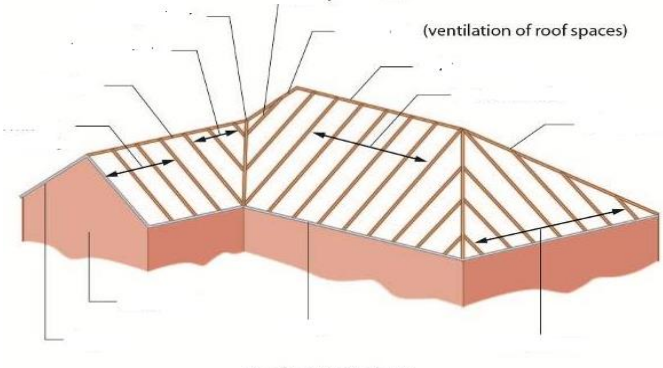
Hazards associated with ground work Pg 20

what things do you need to support earth work… pg 21

Draw a raft foundation pg 22

Draw a short bored piles pg 22

Lable the roof below pg 28



Roofing terminology

SUMMERY

What is pointing Page 25

What is aesthetics ? pg 25

what materials are used in building a house?

What is the function of a roof?

What types of roofs are available?

1

2

List key roofing terminology

3

4

5