



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Construction and the Built Environment

Unit 2
Sustainable Construction



GCN21

[GCN21] Assessment

TIME

1 hour 30 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all eight** questions.

Questions **1, 2, 3** and **7** should be answered in relation to the previously issued pre-release material.

You should **not** bring any of the material previously issued into this examination.

You will be provided with a clean copy of the pre-release material.

INFORMATION FOR CANDIDATES

The total mark for this paper is 120.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in questions **6** and **8**.

A scale ruler is required.

A calculator is required.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total Marks	
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Answer **all** questions

Questions 1, 2, 3 and 7 relate to the pre-release material

Examiner Only	
Marks	Remark

1 (a) List the material used to make the following elements of the dwelling shown in the pre-release material.

- 1. Roof covering _____ [1]
- 2. Windows and external doors _____ [1]
- 3. First floor ceiling _____ [1]

(b) List **seven** functions of a cavity wall.

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____ [7]

3 (a) Using the list below, label the components of the wind turbine shown in Fig. 1:

- Anemometer
- Blade
- Nacelle (housing)
- Gearbox
- Tower
- Rotor
- Generator
- Low speed shaft
- High speed shaft
- Brake

Examiner Only	
Marks	Remark

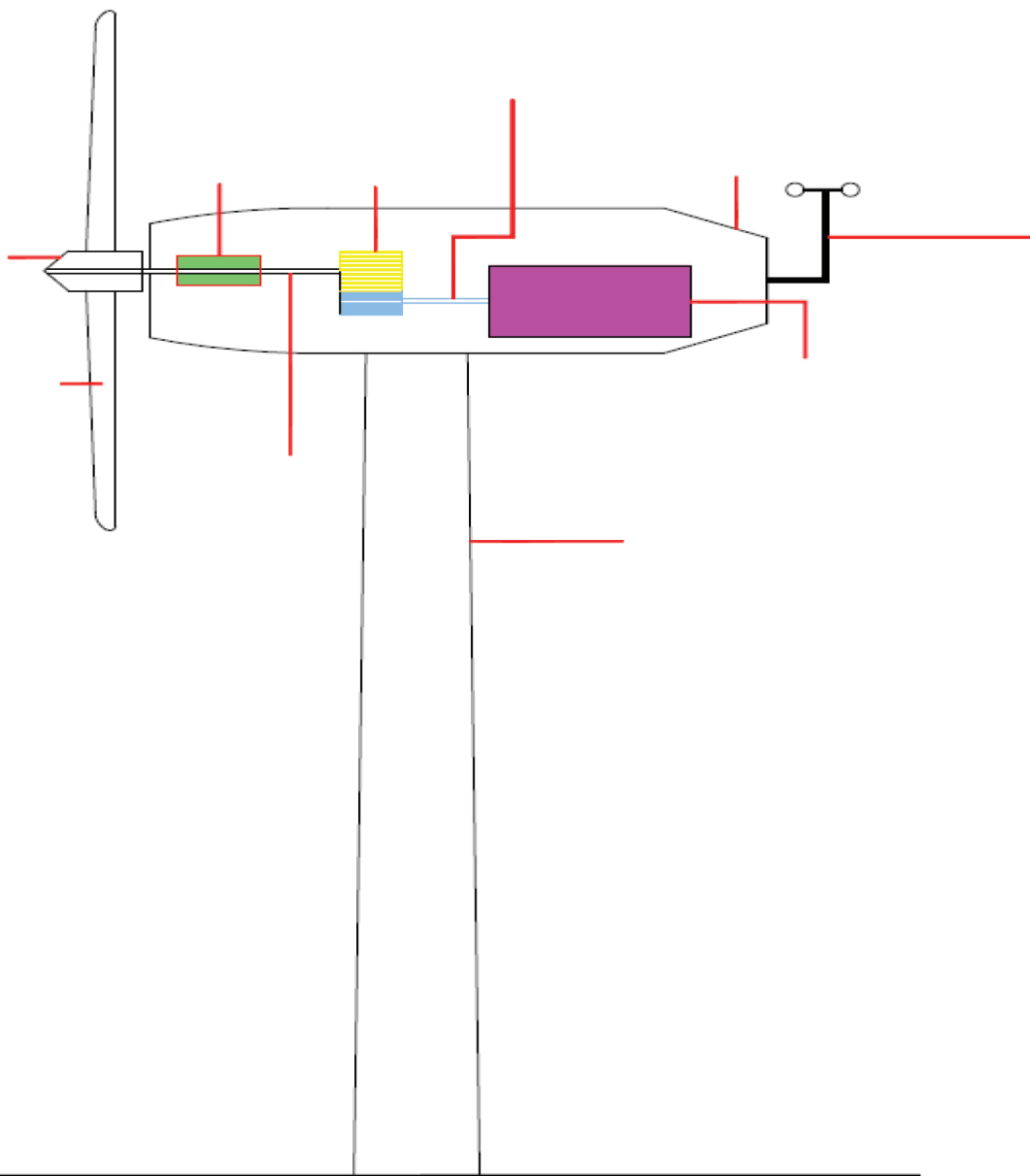


Fig. 1

[10]

(b) Discuss why the location of the dwelling shown in the pre-release material would make a potentially suitable site for generating electricity from a wind turbine.

[4]

Examiner Only	
Marks	Remark

4 Complete a cutting list for the table shown.

The table, apart from the top, should be made from solid oak timber.

All timber rails should have an additional 30 mm of timber at each end, added to their length in order to cut the tenon joint. The oak timber will be finished with 4 coats of varnish.

The table top will be cut to size from 40 mm thick MDF. This MDF will be spray painted so no edging strips will be required. The table top is shown in **Fig. 3**.

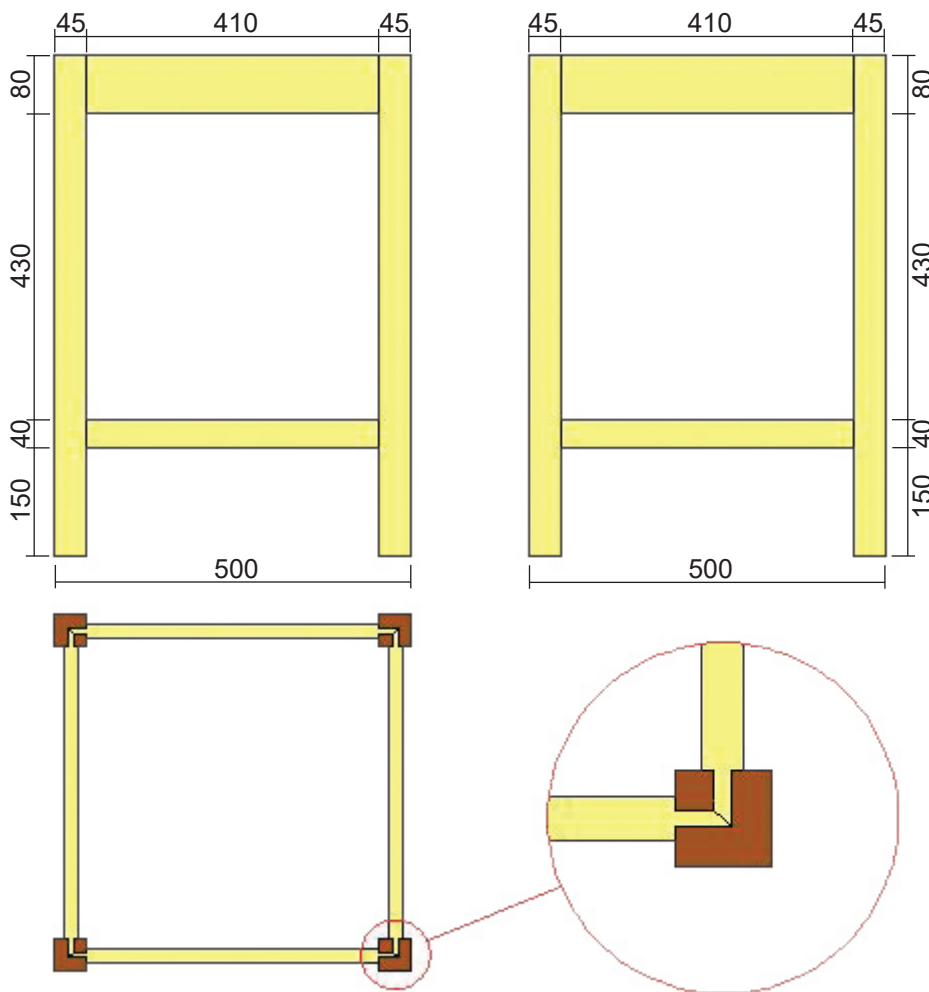


Fig. 2

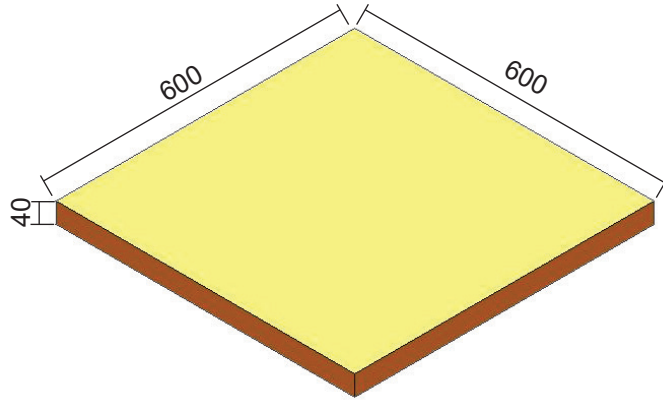


Fig. 3

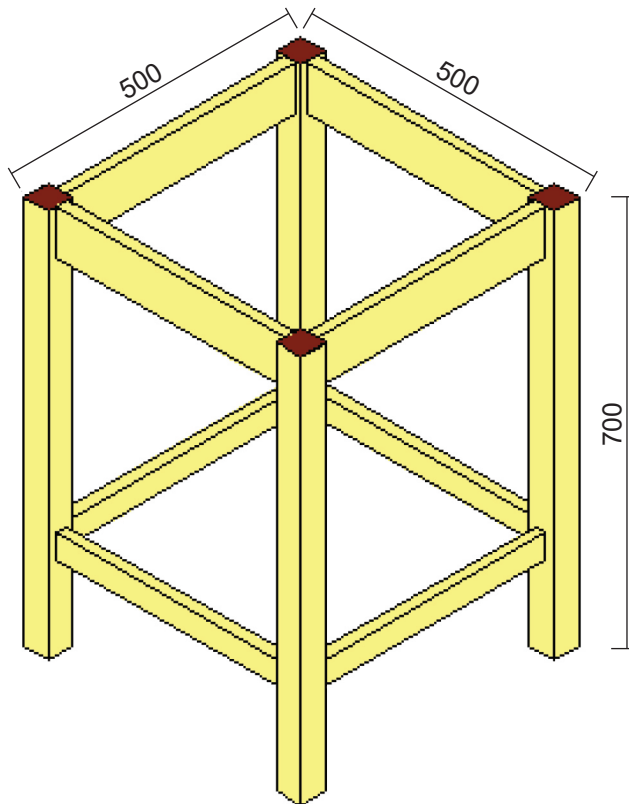
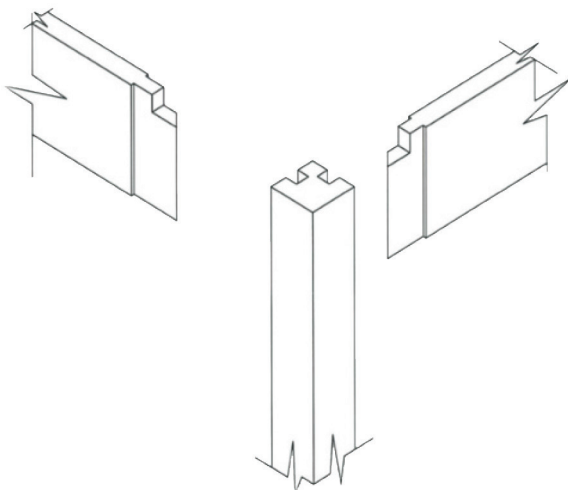


Fig. 4



Mortice and Tenon joints used to join the rails of the table to the legs as shown in Fig. 5.

Fig. 5

The cost of the materials to be used in your table is shown below.

The cost of 45 mm square section oak timber is **£7.46** per linear metre.

Top rails 80 mm × 20 mm planed all round (PAR). Oak timber is **£6.59** per linear metre.

Bottom rails 40 mm × 20 mm planed all round (PAR). Oak timber is **£4.97** per linear metre.

MDF 40 mm thick costs **£62** for a sheet measuring 2440 mm × 1220 mm. You will be able to cut 8 table tops from one sheet of MDF.

Remember to allow 30 mm each end of the rails for cutting out the Tenon Joints.

Item	Part	Quantity	Description of material required	Length in mm	Width in mm	Thickness in mm	Total length required	Total cost
1	Legs	4	Oak	700	45			
2	Top Rails							
3	Bottom Rails							
4	Table Top						8 table tops from one sheet	
Total cost of glue, connection blocks, varnish etc.								£4.20
Total cost of table								£

Please complete the shaded boxes in the cutting list above.

Use the next page for calculations where necessary.

[25]

Examiner Only	
Marks	Remark

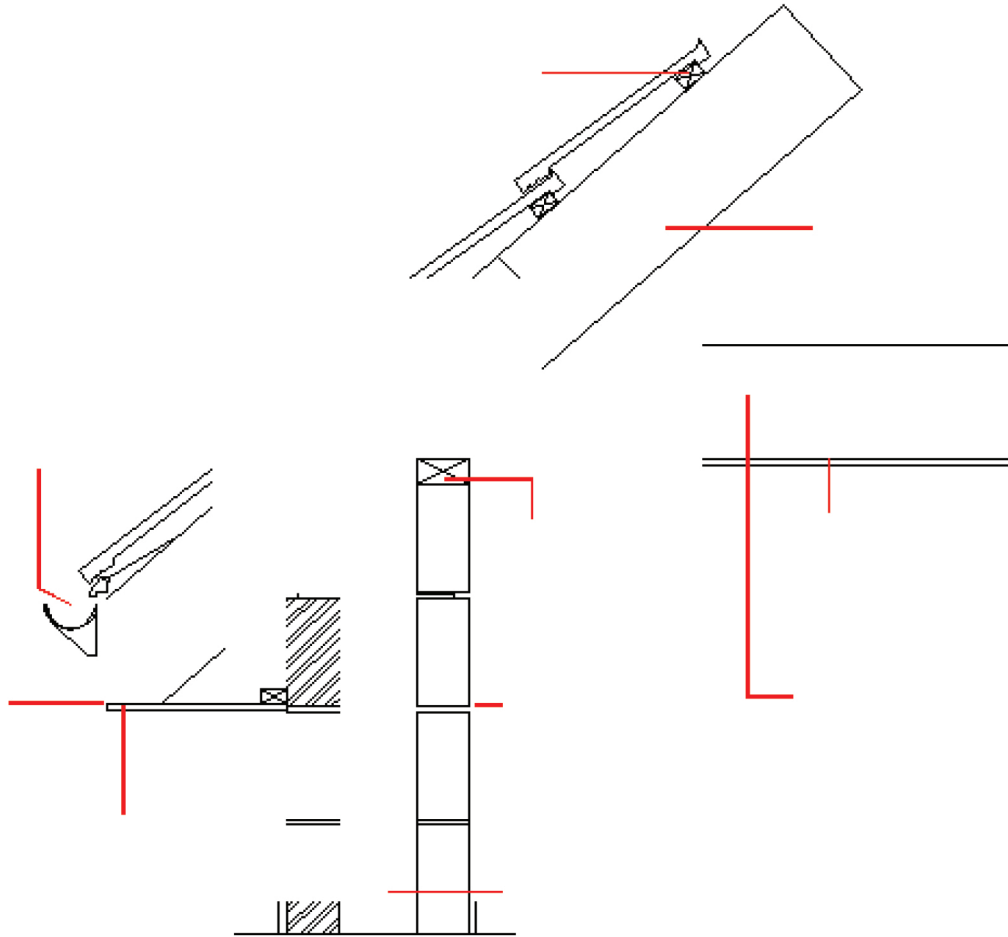


Fig. 6

(c) Analyse the eaves detail you have completed in **Fig. 6** and explain how human comfort has been improved by current construction materials/methods when compared with one hundred years ago.

[4]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

- 6 A housing association has purchased an old concrete-framed office block, as shown in **Fig. 7**. The office block was constructed in 1972 and incorporated no insulation within its construction. Water was leaking in around the window openings and the flat roof was also leaking. All parts of the building have been removed and recycled other than the concrete frame and concrete floors which will be reused.

The office block is to be converted into 35 individual living units which could accommodate up to 135 people. Four of the units are for **physically disabled** residents.



Fig. 7

Analyse the photograph and suggest **suitable construction methods** to regenerate the building under the following headings:

Walls

Windows

Roof construction

Justify your answer by stating how the new construction methods will have a positive long-term impact on the natural environment, both in terms of the amount of energy used to heat the building and the quality of living accommodation for the residents in the local community.

Your answer should also consider the **reduced carbon footprint** of retaining the **old concrete** frame when compared to the construction of a completely new building.

The quality of written communication will be assessed in this question.

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