

## SECTION B

Questions 5–8 relate to the **British Geological Survey 1:63 360 geological map**  
extract from **Malmesbury (Sheet 251)**

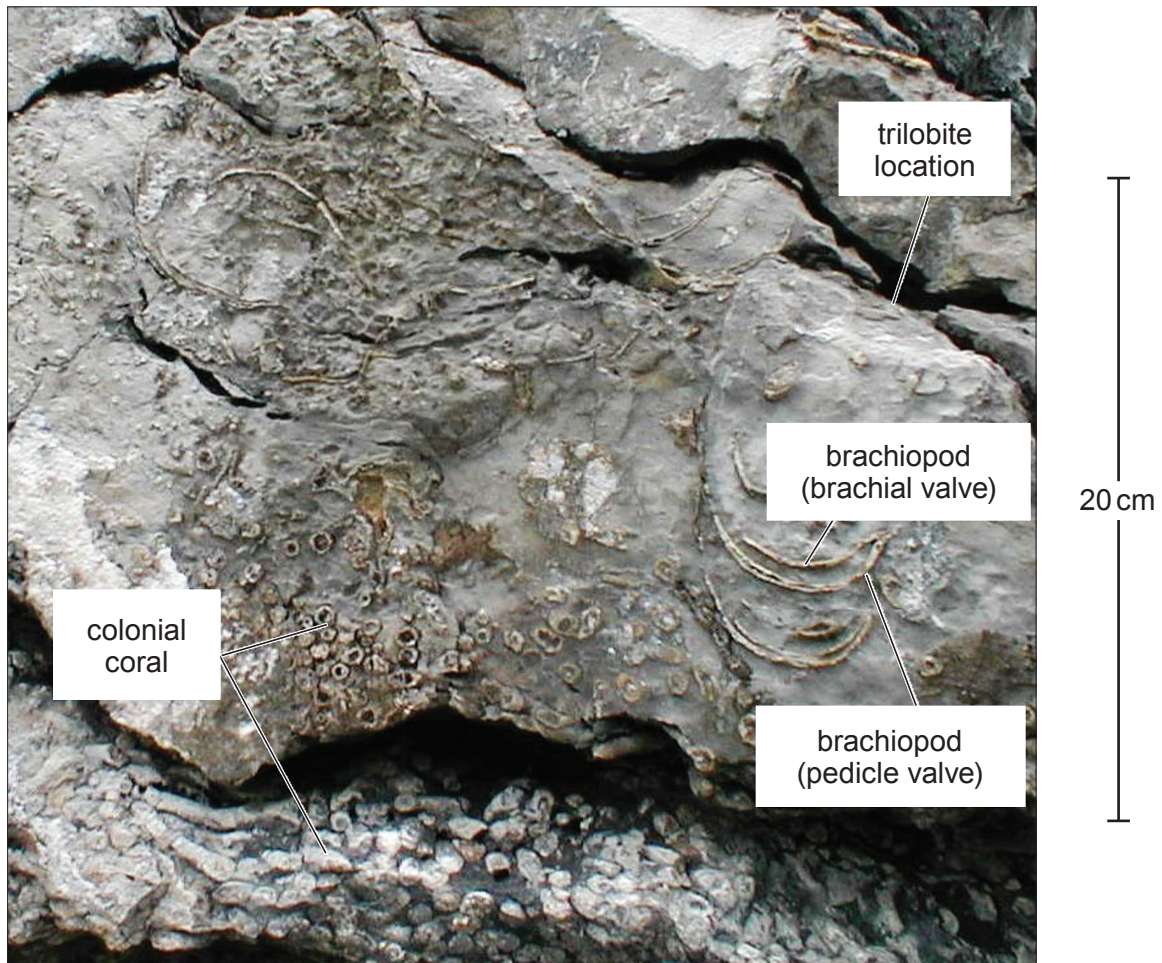
Answer **all** questions in the spaces provided.  
This section should take approximately 1 hour to complete.

5. (a) (i) State the area covered by **box Z** on the **geological map** (in square kilometres).  
..... square kilometres. [1]
- (ii) Describe and explain the shape of the Triassic strata that crop out in **box Z**. [2]  
.....  
.....  
.....
- (b) **Map P** (an extract of the **geological map** at a larger scale) shows **Grid Square 6688** in which a near vertical dip-slip fault is seen to crop out.
- (i) Describe the **field observations** that might have been made to enable the fault to be drawn on the **geological map** at this location. [3]  
.....  
.....  
.....  
.....
- (ii) Draw a geological **sketch** section across the fault along the line **X–Y**. With reference to the **generalised vertical section**, clearly label the **individual units** of the Clifton Down Group (**d<sup>2</sup>**). [3]

X \_\_\_\_\_ Y

6. **Figure 6a** is a photograph of a vertical section of Clifton Down Limestone ( $d^2$ ), showing a typical fossil assemblage. **Figure 6b** is a photograph of part of a trilobite, also identified in the limestone.

Examiner  
only



**Figure 6a**



**Figure 6b**

- (a) (i) State the function of morphological feature **T** in **Figure 6b**. [1]

*Function* .....

- (ii) Explain how the morphological features of this specimen provide evidence for the trilobite's mode of life. [3]

*Mode of life* .....

.....

.....

.....

- (b) (i) With reference to **Figure 6a**, explain the evidence to support the hypothesis that the Clifton Down Limestone (**d**<sup>2</sup>) was formed in a warm tropical sea. [2]

.....

.....

.....

- (ii) A student suggested that

*“the fossils in this section of the Clifton Down Limestone indicate a decrease in the energy of the environment with time.”*

Critically evaluate this statement with reference to **Figure 6a** and **Figure 6b**. [3]

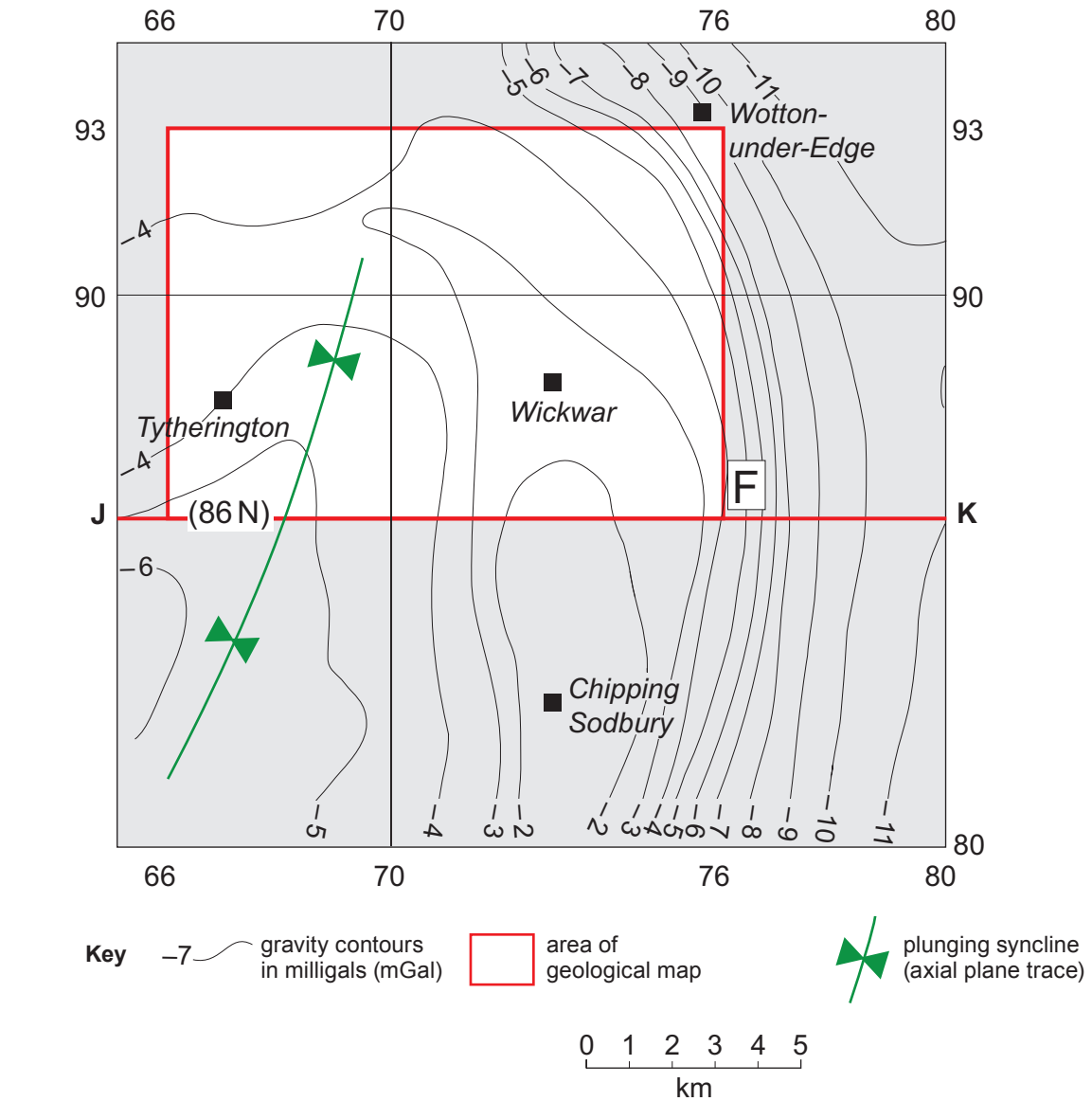
.....

.....

.....

.....

7. **Figure 7a** shows a Bouguer gravity anomaly map of the region which includes the area of the geological map. **Figure 7b** is a partly completed gravity anomaly profile along the grid line 86 (N) from J to K on **Figure 7a**.



**Figure 7a**



**Figure 7b**



Refer to **Figures 7a** and **7b**, the **geological map** and **geological cross section**.

- (a) Complete **Table 7** below by stating the evidence from the **geological map alone** that the plunging syncline, indicated on **Figure 7a**, shows the following fold characteristics:

1. a synform
2. a syncline
3. a plunge to the SSW

[3]

Fold Characteristics	Evidence
1. a synform	•
2. a syncline	•
3. a plunge to the SSW	•

**Table 7**

- (b) Complete the profile on **Figure 7b** to show the variation in the gravity anomaly profile along the **grid line 86 (N)** from **J** to **K** on **Figure 7a**. [2]

- (c) *"The Bouguer gravity anomalies along **grid line 86** can be explained by:*

1. *differences in the mean rock density*
2. *the geological structure."*

- (i) Suggest what conclusions might be made about the relative densities of Carboniferous strata that crop out in the core of the syncline compared with those which crop out on its limbs. Explain your answer. [2]

.....

.....

.....

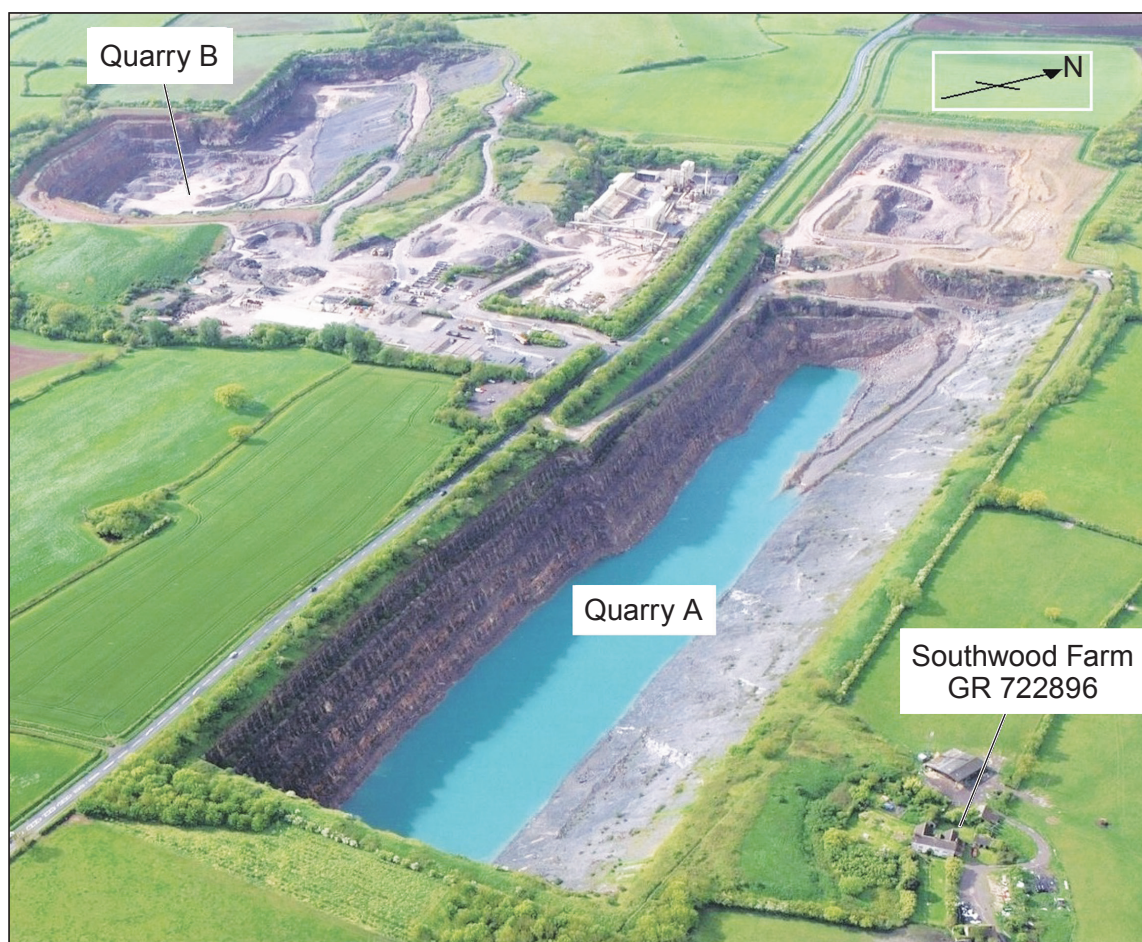
- (ii) The Bouguer gravity anomaly data provides evidence for an **unmapped** fault below location **F** on **Figure 7a**. Explain the gravity data evidence to support this conclusion. [2]

.....

.....

.....

8. **Figure 8a** is a photograph of Wickwar Quarry (**grid square 7189**) looking NW. The quarry workings are split into two areas labelled **Quarry A** and **B**.



**Figure 8a**

Refer to the **geological map, Map Q, geological section** and **Figure 8a**.

- (a) (i) Complete **Table 8** to describe the following characteristics of **Quarry A** and **Quarry B**:

- angle of dip of the limestone in **Quarry A**
- general direction of the dip of the limestone in **Quarry A**
- name of the limestone being quarried in **Quarry B**

[3]

Quarry	Rock type being quarried	Maximum thickness (m)	Dip (degrees)	Approximate dip direction
<b>A</b>	Black Rock Limestone (BRL), Dolomite (BRD) and Gulley Oolite (& Limestone)	see part (iii)	•	•
<b>B</b>	•	115	20	SW

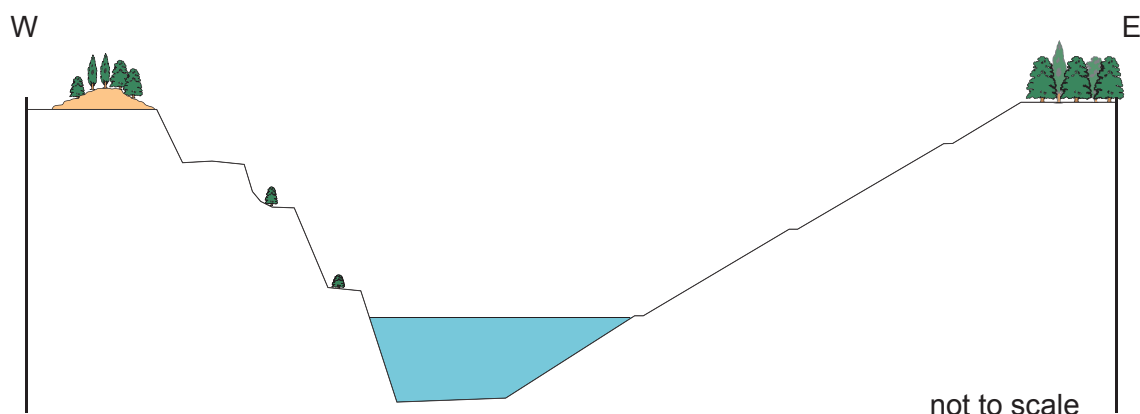
**Table 8**

- (ii) Explain why the limestone beds seen on the western face of **Quarry A** appear to be horizontal although the **geological map** shows the limestone to be dipping. [1]

- (iii) Using the **generalised vertical section**, calculate the **maximum** thickness of the limestone beds in **Quarry A** identified in **Table 8**. Show your working. [2]

Maximum thickness = ..... m

- (b) (i) **Figure 8b** is a section showing the land surface across **Quarry A**. Use **Figure 8b** to explain how the stability/steepness of the quarry faces are controlled by the dip of the beds. You are required to use annotations. [3]



**Figure 8b**

- (ii) Explain the **geological** factors that may have contributed to limit the growth and development of limestone quarrying along the eastern and western margins of either **Quarry A** or **Quarry B**. [4]

Chosen Quarry (**A** or **B**)

☐

.....

.....

.....

.....

.....

**END OF PAPER**

## Acknowledgements

**Figure 4a** – [http://stratus.astr.ucl.ac.be/textbook/chapter2\\_node14](http://stratus.astr.ucl.ac.be/textbook/chapter2_node14)

**Figures 4b and 4c** – Hancock & Skinner – Oxford companion to the Earth

**Figure 6b** – BGS <http://www.3d-fossils.ac.uk/fossilType.cfm?typSampleId=25000745>

**Figure 7a** – adapted from Figure 25 – Malmesbury district. Memoire for sheet E25: Cave R.

**Figure 8a** – <http://www.cemexcommunities.co.uk/documents/WickwarPCExtension.pdf>



