

SECTION B

Questions 5 – 7 relate to the **British Geological Survey 1:25 000 geological map extract of Matlock**

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

5. (a) (i) State the **main** superficial deposit (drift) on the **Geological Map**. [1]

- (ii) Describe the major features of the outcrop pattern of the **Carboniferous Limestone Series** on the **Geological Map** by completing the table below. [3]

Outcrop pattern	Measurement or description
Maximum NW - SE length	• km
Maximum NE - SW width	• km
General shape	•

- (b) Describe the characteristics of the major fold structure on the **Geological Map** and **cross section**. [4]

.....

.....

.....

.....

.....

- (c) Refer to the line of section **A-B** in **grid square 3364** on the **Geological Map** and the cross sections (**X**, **Y** and **Z**) in **Figure 5** below.

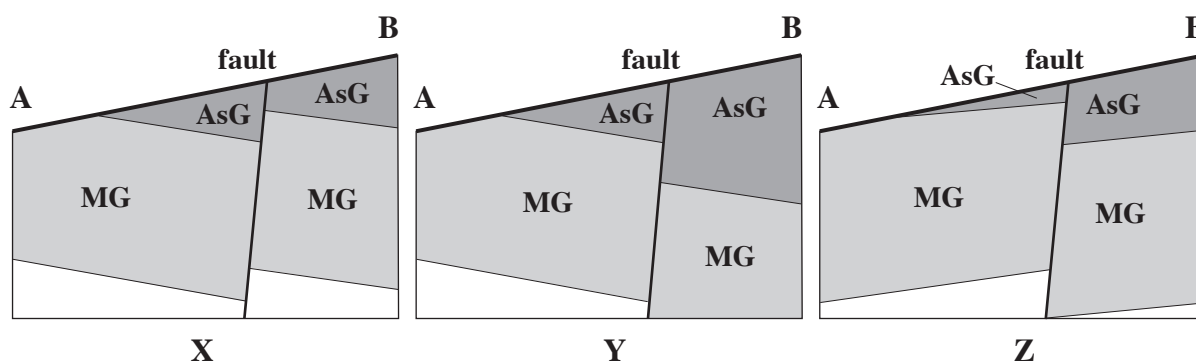


Figure 5

- (i) State which of the cross sections (**X**, **Y** or **Z**) is most likely to represent the geology below the line of section **A-B**. [1]

Choice of section (**X**, **Y** or **Z**)

- (ii) Describe the map evidence in **grid square 3364** that supports this choice for the displacement of the Ashover Grits (**AsG**) across the fault. [1]

.....

- (iii) Explain how the outcrop pattern around Hardwick Wood (**GR 335644**) might confirm the direction of dip of the Ashover Grits (**AsG**) in this area. [2]

.....

.....

Total 12 marks

6. **Table 6** is a partly completed tally of orientations of the main mineral veins on the **Geological Map**. **Figure 6** is a partly completed rose diagram of vein orientations.

N-S		NE-SW		E-W		NW-SE	
/		////	////	////	////	////	////
		////	////	////	////	////	/
		//					
Total	1	Total	•	Total	20	Total	•

Key	
/	= 1 mineral vein
////	= 5 mineral veins

Table 6

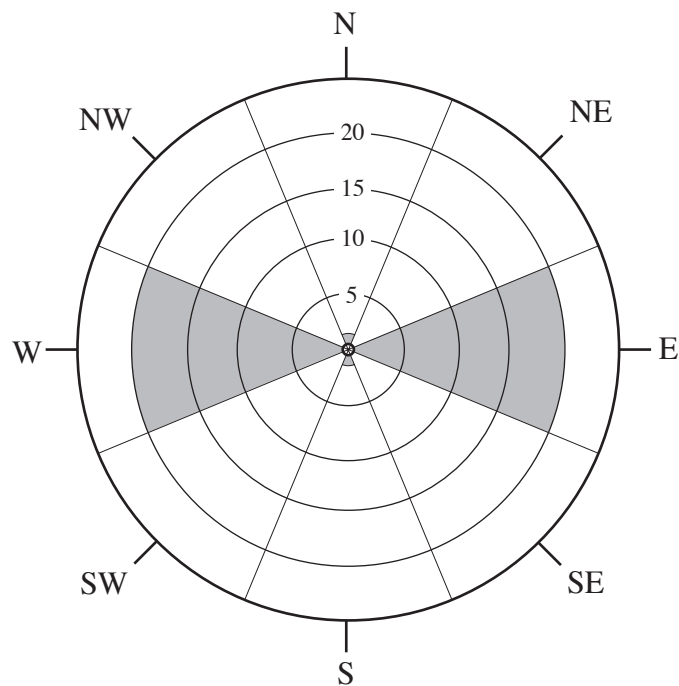


Figure 6

- (a) Name **one** metal ore that has been mined in this region.

[1]

- (b) (i) The tally in **Table 6** does not include the 4 mineral veins within **Box C** on the **Geological Map**. An enlargement of **Box C** is found on the map extract. Add these to the tally and complete the totals for the data set. [2]
- (ii) Complete the rose diagram (**Figure 6**) to show the orientations of the veins for the completed data set in **Table 6**. [3]
- (iii) Describe and account for the orientation and distribution of mineral veins on the **Geological Map**. [3]

.....

.....

.....

.....

- (c) Some mineral veins have formed along vertical fault planes.

- (i) Critically assess the map evidence that the Gregory vein (**GR 340618**) has formed “**along a vertical fault plane**”. [2]

.....

.....

.....

- (ii) Explain **one** piece of **field** evidence (other than displacement) that might indicate that the Gregory vein formed along a fault. [2]

.....

.....

.....

Total 13 marks

Turn over.

7. (a) **Figure 7** is a partially complete survey of radon gas concentrations in soil samples along the line of section drawn across the **Geological Map**. Further survey data are given in the information box (**Table 7**). The Key to the superficial (drift) deposits is on the map extract.

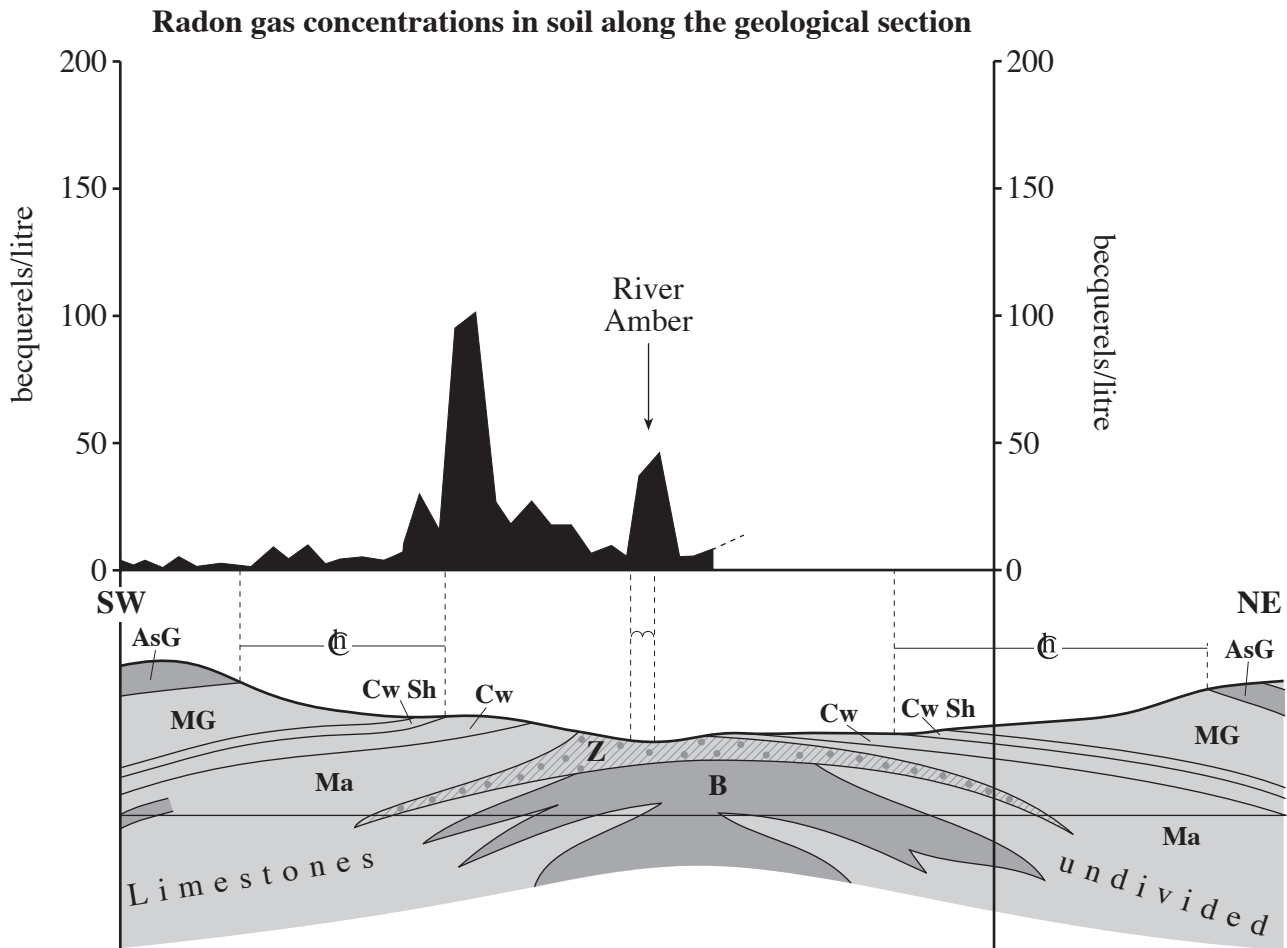


Figure 7

Radon gas concentrations in soil

Radon gas concentrations reach a maximum of 150 becquerels/litre on the NE side of the Amber Valley. The release of radon gas into the soil partly depends on the permeability of the underlying rock and the presence of any overlying superficial (drift) deposits.

Source: Quarterly Journal of Engineering Geology 24 1991
The Geological Society.

Table 7

- (i) Using the data given, complete the survey on **Figure 7** by estimating the size and probable extent of radon gas concentrations in soils to the **NE** of the River Amber. [2]
- (ii) Describe and account for the change in radon gas concentrations in soil samples above the outcrops of **either**:
1. the Millstone Grit Series - Shale (**MG**).
 - or**
 2. the Carboniferous limestones - **Cw** and **Ma**
- [4]

Chosen unit 1 or 2

☐

.....

.....

.....

.....

.....

- (b) The area of the Amber Valley between **GR 343632** and **GR 355622**, where it is underlain by **Tuff (Z)**, could be developed as a reservoir.

Using evidence from the **Geological Map**, **cross section** and other data, assess the geological factors **that would need to be investigated** prior to such a development.

In particular you should discuss

- the geological suitability of the valley as a reservoir site and
- any potential pollution hazards.

[5]

.....

.....

.....

.....

.....

.....

.....

.....

Total 11 marks

[illegible]