

<b>Candidate Forename</b>		<b>Candidate Surname</b>	
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<b>Centre Number</b>						<b>Candidate Number</b>				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
ADVANCED SUBSIDIARY GCE**

**F792**

**GEOLOGY**

**Rocks – Processes and Products**

**THURSDAY 27 MAY 2010: Afternoon**

**DURATION: 1 hour 45 minutes**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the Question Paper**

**OCR SUPPLIED MATERIALS:**

**Insert: repeat of diagram for question 3.**

**OTHER MATERIALS REQUIRED:**

**Electronic Calculator**


**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer ALL the questions.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

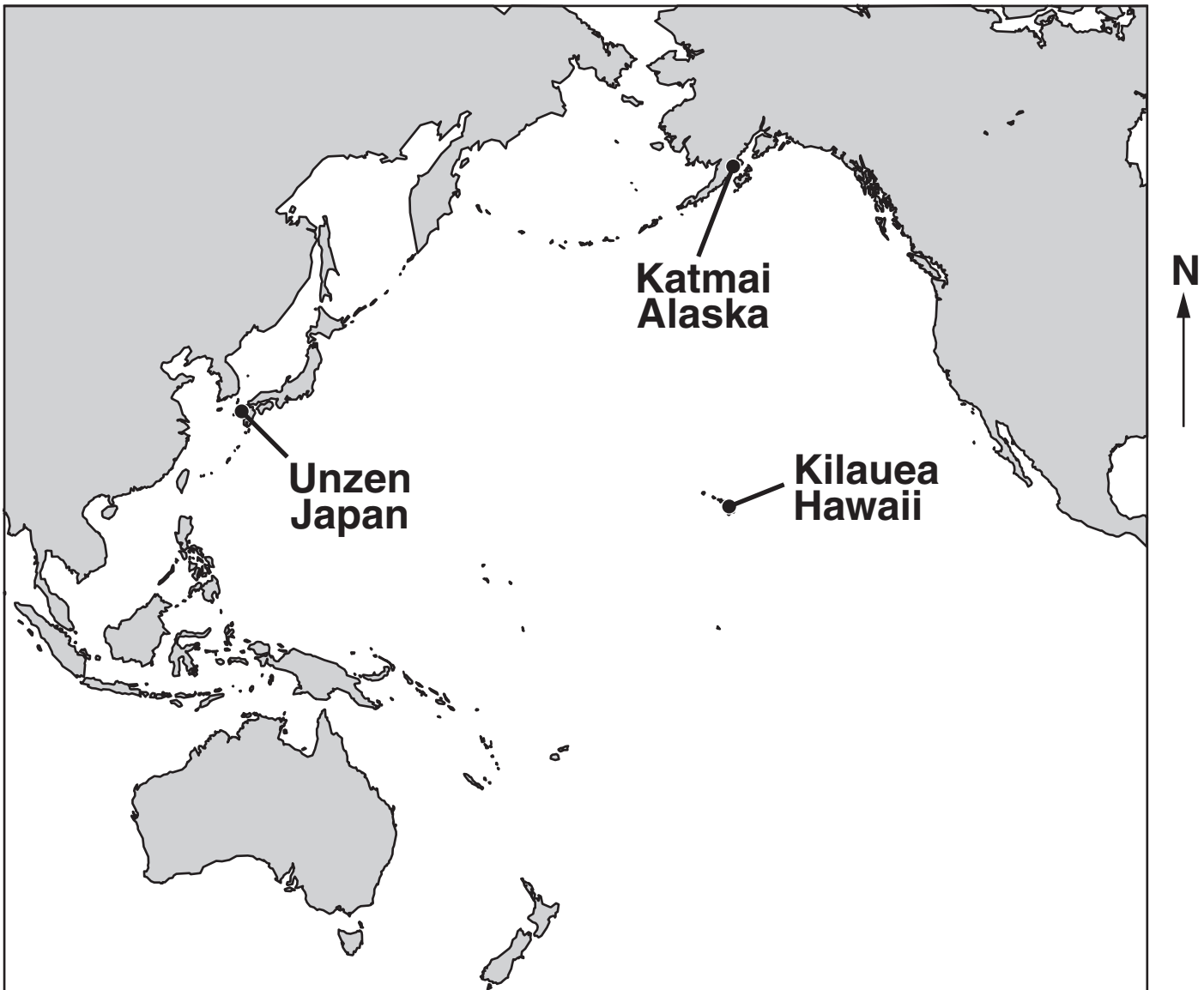
## **INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 100.
-  Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

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Answer ALL the questions.

- 1 The map below shows the location of three volcanoes around the Pacific.



- (a) (i) Shade the area where volcanoes are found around the Pacific. [2]

- (ii) State the plate tectonic setting for the volcanoes at:

Unzen \_\_\_\_\_

Kilauea \_\_\_\_\_ [2]

**(b) Describe the type of volcanic activity that takes place and the products produced at:**

**Katmai in Alaska** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]

**Kilauea in Hawaii** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

**(c) Describe TWO volcanic hazards that are likely to affect people who live within 10 km of Unzen in Japan.**

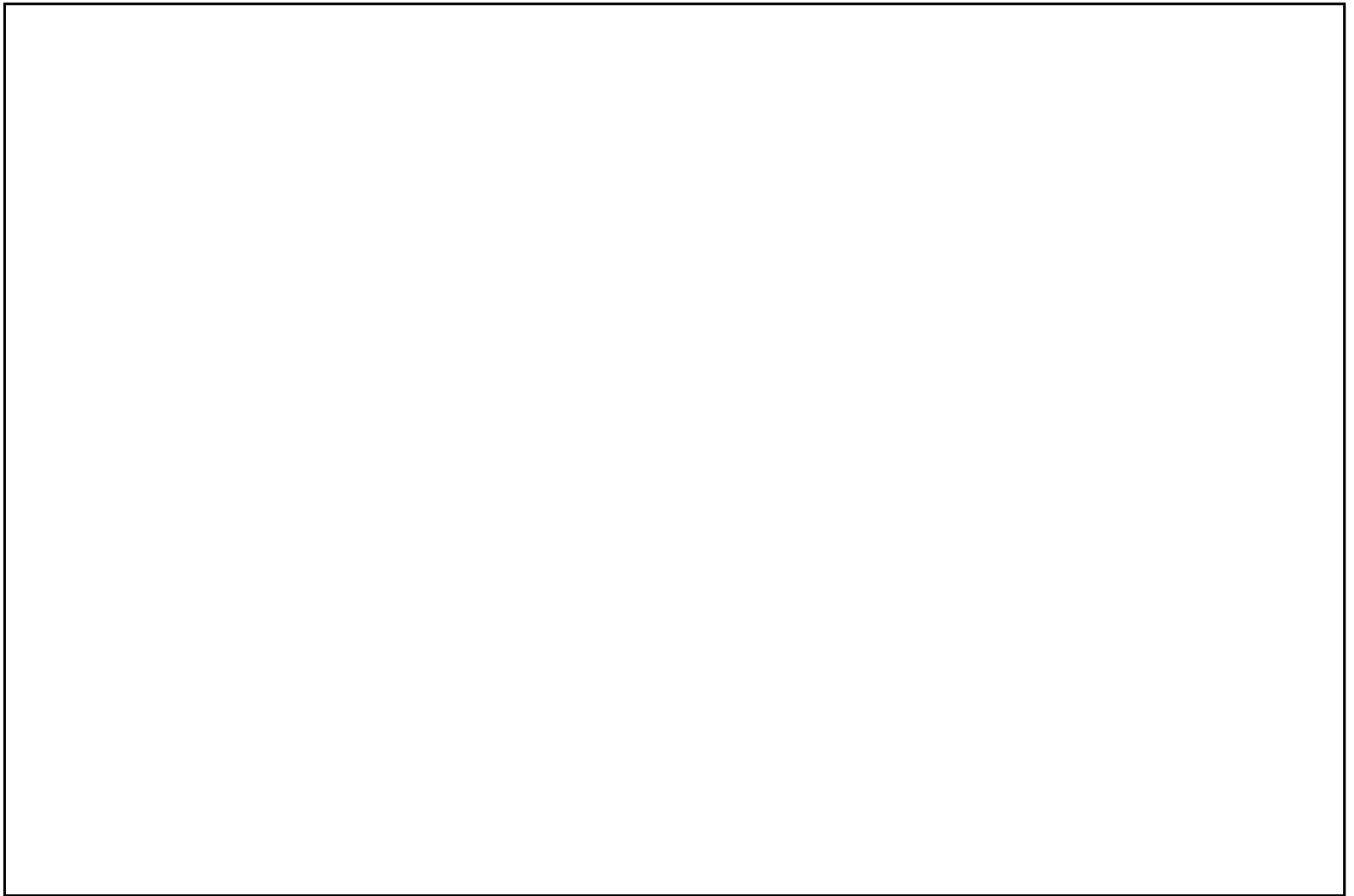
**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_ [2]

**(d) Describe clearly how a caldera forms. You may use diagrams to help you make your description.**



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[4]

**(e) Describe what a geyser is.**

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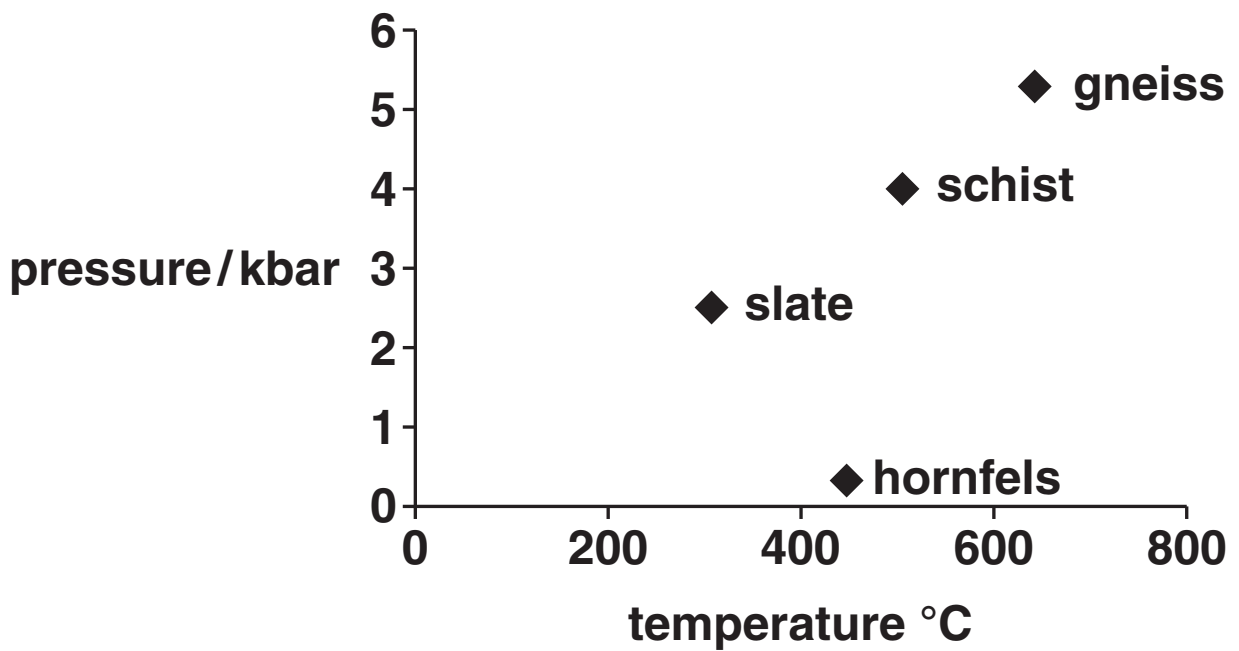
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[1]

**[Total: 16]**

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2 (a) The diagram below shows a pressure/temperature plot for four rocks.



(i) Shade and label the area of the diagram where regional metamorphism takes place. [1]



**(ii) Complete the table below with the names of the four rock types shown on the diagram.**

**You may use each rock type more than once.**

<b>formed at the greatest depth</b>	
<b>been re-crystallised by contact metamorphism</b>	
<b>has a cleavage</b>	
<b>a coarse banded texture</b>	
<b>no preferred orientation of its minerals</b>	
<b>parallel alignment of muscovite mica crystals</b>	

**[4]**

**(b) (i) Explain the differences between the processes that form cleavage and schistosity.**

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**[3]**

(ii) Explain the difference between the formation of a phenocryst and a porphyroblast.

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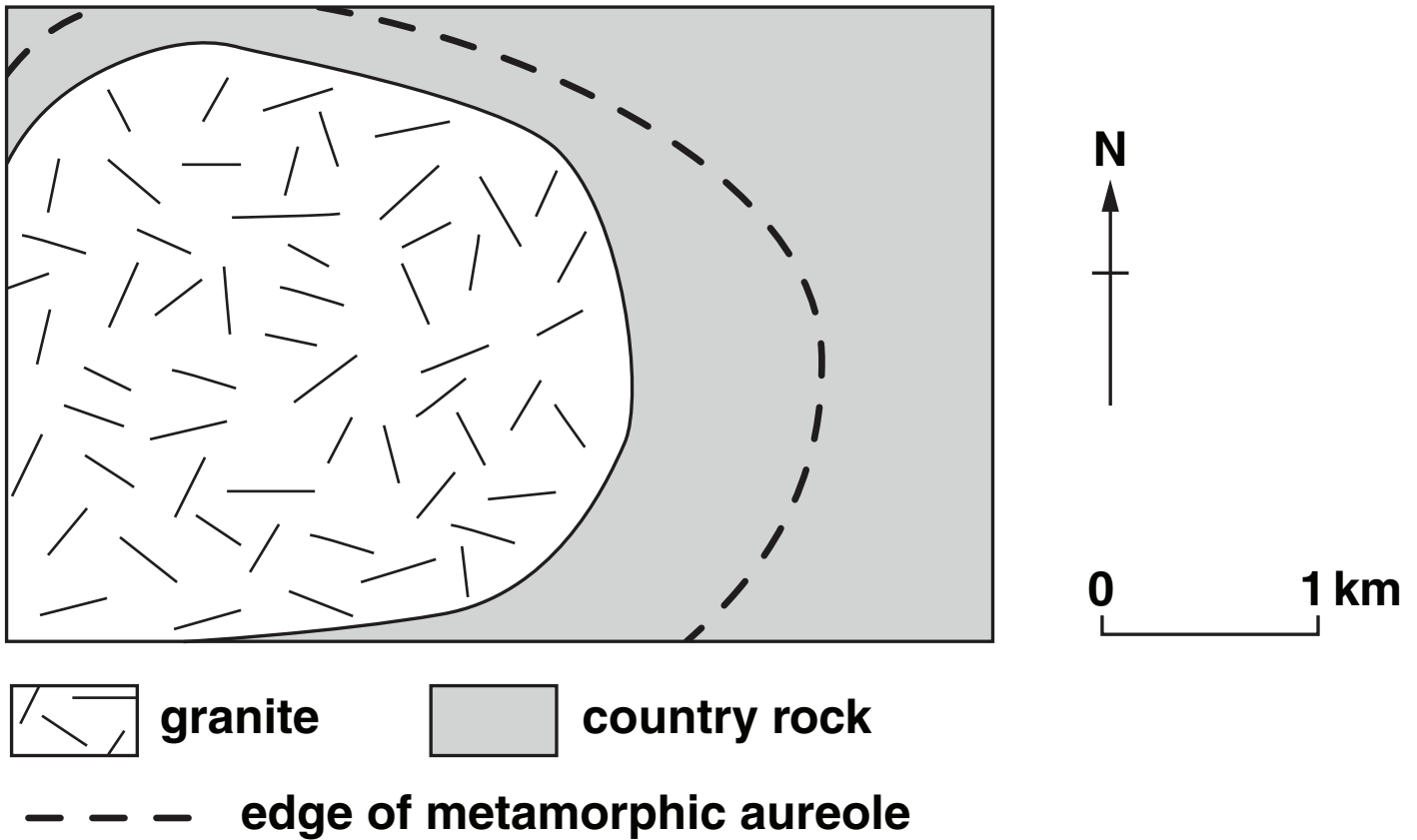
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[2]

(c) The map below shows a metamorphic aureole around a granite.



(i) Label on the map where you would find spotted rock.

[1]

**(ii) Explain how a spotted rock forms.**

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[2]

**(iii) Explain why the width of the metamorphic aureole may vary.**

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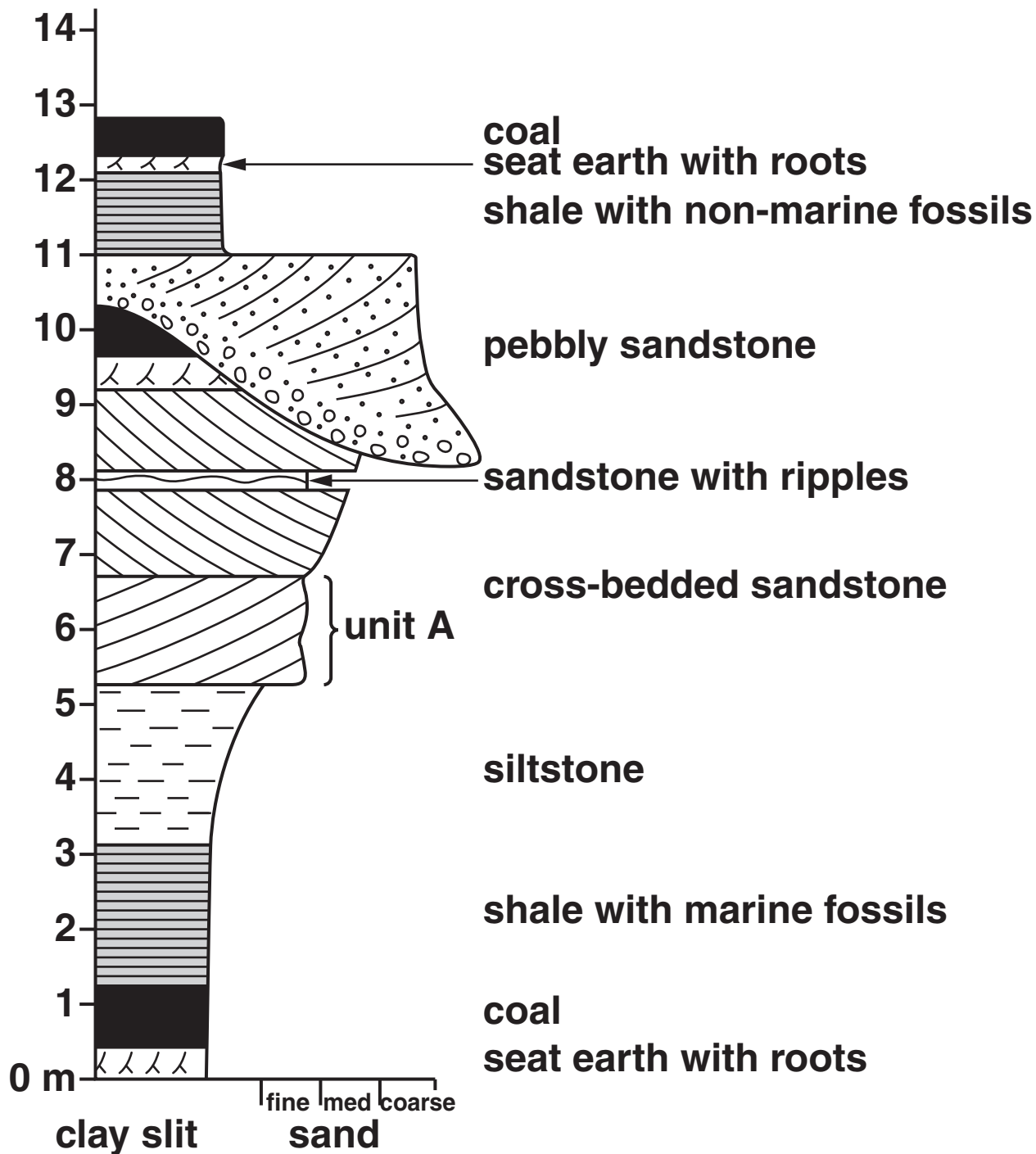
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[2]

**[Total: 15]**

3 The diagram below is a graphic log through a sequence of sedimentary rocks. The two thinnest beds are indicated by arrows.



**(a) (i) What is the grain size of UNIT A?**

\_\_\_\_\_ [1]

**(ii) Label a cyclothem on the graphic log. [1]**

**(iii) Continue the graphic log to show a younger bed that is a coarse sandstone and is 80 cm thick. [1]**

**(iv) Describe how the beds of coal and the seat earth with roots formed.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**(v) Explain why the base of the pebbly sandstone is drawn at an angle.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(b) Describe as a numbered list each of the environments in which this sequence of rocks was laid down. Start with the oldest beds. A copy of the graphic log is provided as an insert.**

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**[4]**

**(c) (i) Describe clearly how cross bedded sandstones are formed. You may use diagrams to help you make your description.**



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**[3]**

- (ii) The dip of the cross bedding was measured at a number of localities.  
Calculate the average dip.

23°	28°	35°
18°	32°	30°
11°	24°	27°
15°	14°	19°

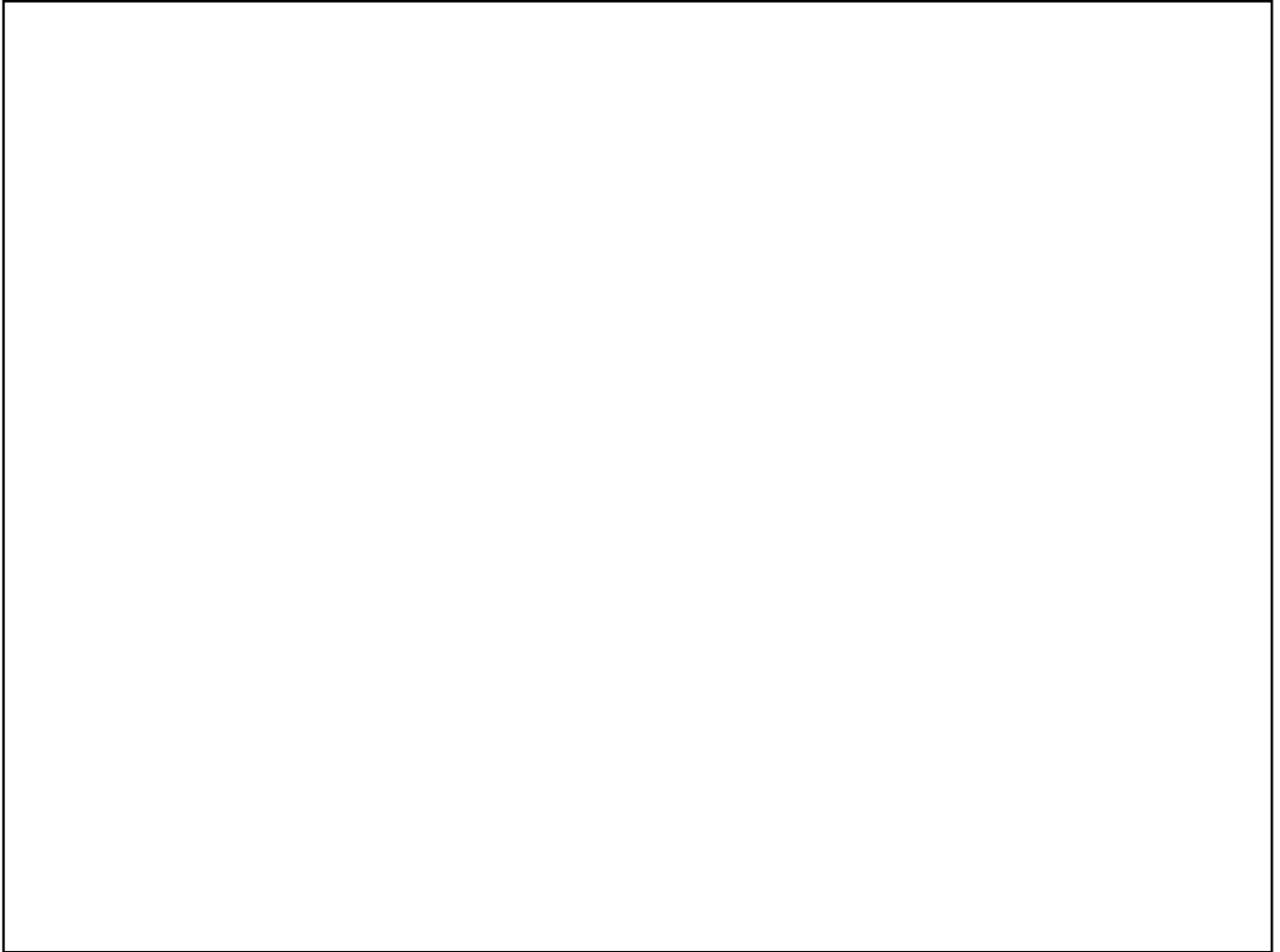
average dip \_\_\_\_\_ ° [1]

- (iii) Why was the angle of dip never greater than 35°?

\_\_\_\_\_  
\_\_\_\_\_ [1]



**(d) Describe clearly how ripple marks are formed in a river. You may use a diagram to help you make your description.**



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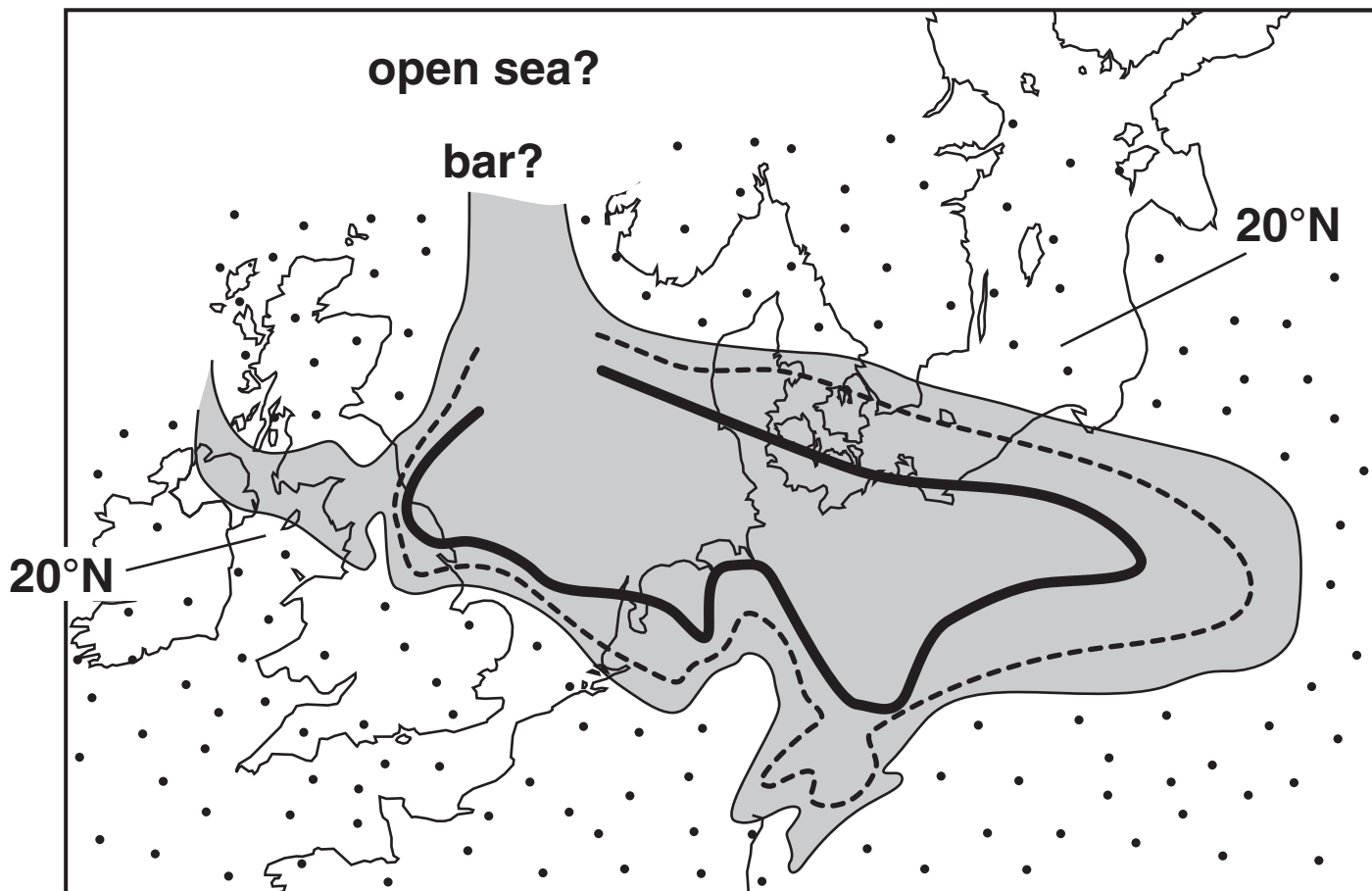
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**[2]**

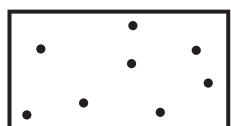
**[Total: 17]**

4 The diagram below shows the palaeogeography of north west Europe during Permian times, about 260 Ma, when the Zechstein Sea covered the area.



— limit of potash salts (K salts)

- - - - - limit of halite (NaCl)

 land

 sea

- (a) (i) What type of climate existed in north west Europe during the Permian?  
Explain your answer.**

climate \_\_\_\_\_

explanation \_\_\_\_\_

\_\_\_\_\_ [2]

- (ii) Describe how these salts formed in the Zechstein Sea.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

- (iii) A deep borehole through the Zechstein salt deposits found four separate sequences of salts. Explain how the salt deposits formed four times.**

\_\_\_\_\_

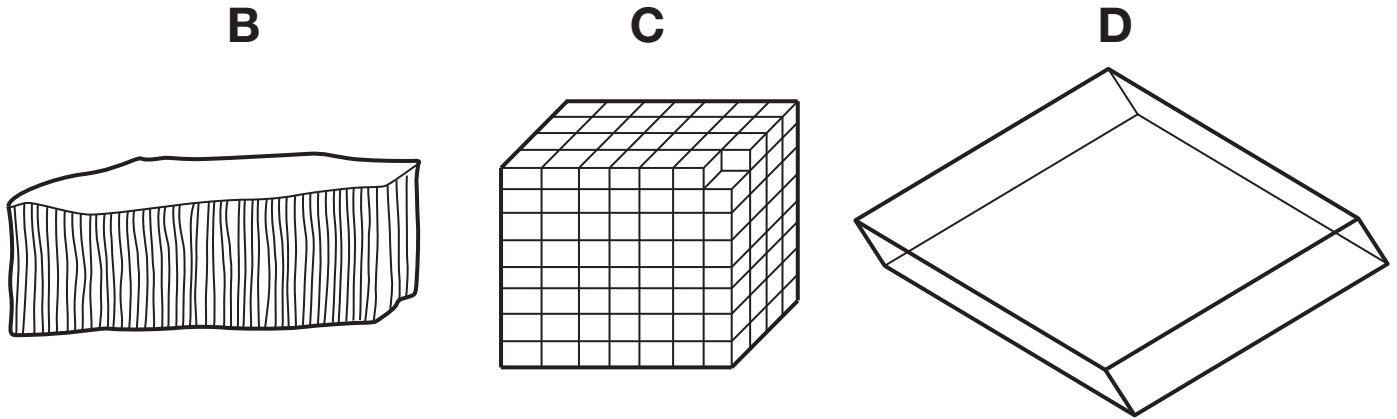
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\_\_\_\_\_ [2]

**(b) The table opposite shows data on a series of minerals found in the Zechstein deposits.**

**(i) Using the information in the table identify the three minerals B, C and D.**



**B** \_\_\_\_\_

**C** \_\_\_\_\_

**D** \_\_\_\_\_ [2]

**(ii) The differences in hardness between these minerals is small, as shown in the table. Describe the hardness tests that could be used to distinguish these minerals.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

<b>SPECIFIC GRAVITY</b>	<b>CRYSTAL SYSTEM AND CLEAVAGE</b>	<b>HARDNESS</b>	<b>COMPOSITION</b>	<b>COLOUR</b>	<b>NAME</b>
2	varies	2	K salts	white	potash salts
2.3	massive or cubic with excellent cleavage so cleaves into smaller cubes	2.5	NaCl	white	halite
2.9	massive layers	3	CaSO <sub>4</sub>	white	anhydrite
2.2	fibrous layers	2	CaSO <sub>4</sub> .2H <sub>2</sub> O	white or pink	gypsum
2.8	massive or rhombohedral but faces are often curved	3.5	CaMg(CO <sub>3</sub> ) <sub>2</sub>	white	dolomite
2.7	massive or rhombohedral with three planes of cleavage so cleaves into smaller rhombs	3	CaCO <sub>3</sub>	white	calcite

- (iii) Starting from the bottom, the order that the minerals appear in the table is the order of crystallisation from sea water. Explain why crystallisation occurs in this order.**

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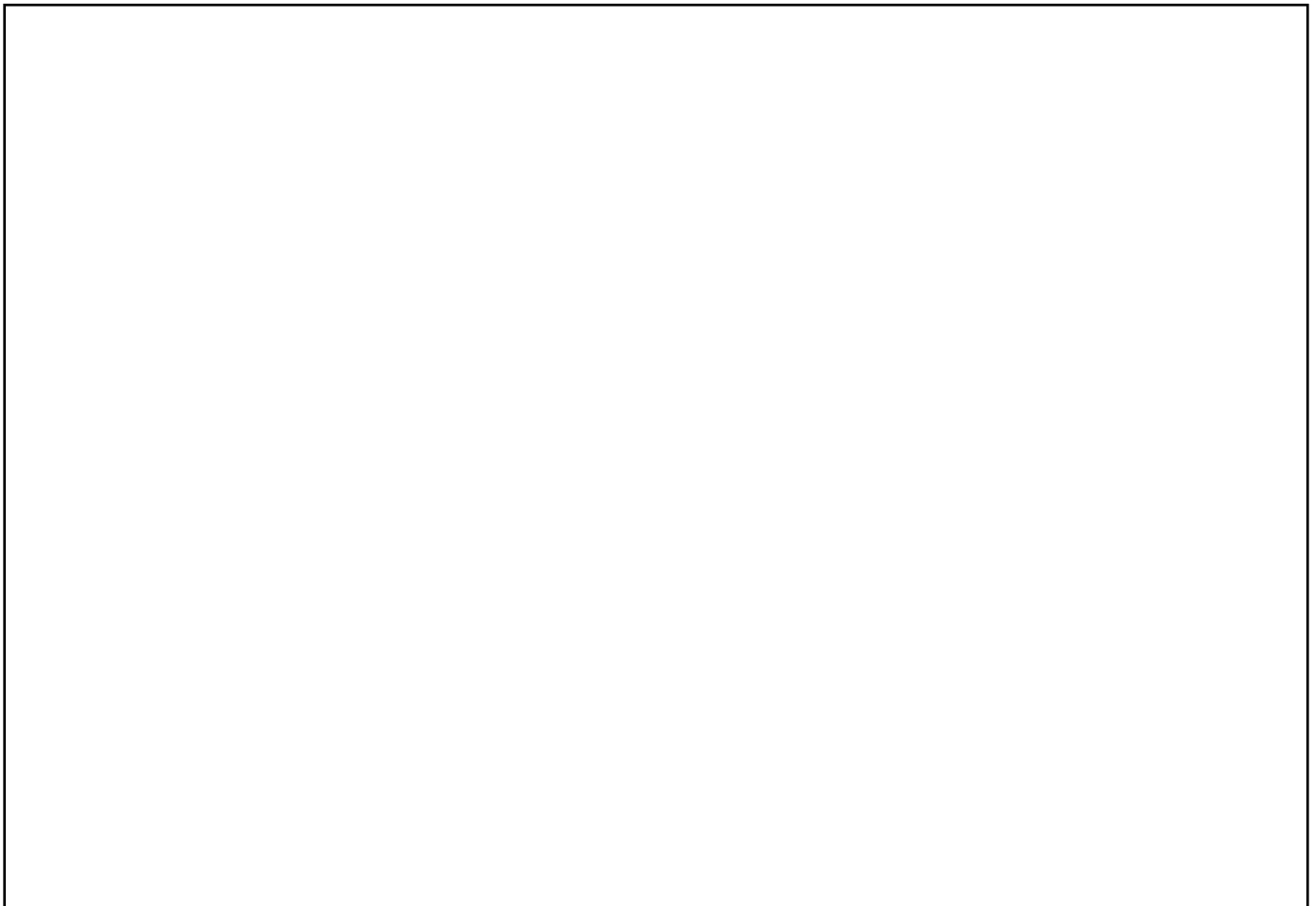
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[2]

- (c) Describe how desiccation cracks form around the edge of a shallow sea like the Zechstein Sea. You may use diagrams to help you make your description.**



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[3]

**[Total: 15]**

- 5 The table below shows the percentage of silica in four plutonic igneous rocks.

	ROCK E	ROCK F	ROCK G	ROCK H
SiO <sub>2</sub> %	70.8	62.5	41.7	49.0

- (a) (i) Define the term plutonic.

\_\_\_\_\_ [1]

- (ii) Name the compositional groups for rocks, E, F, G and H.

E \_\_\_\_\_ F \_\_\_\_\_

G \_\_\_\_\_ H \_\_\_\_\_ [3]



**(b) Use the table of data below showing the mineral composition of three igneous rocks to answer the following questions.**

<b>MINERAL</b>	<b>ROCK J %</b>	<b>ROCK K %</b>	<b>ROCK L %</b>
<b>QUARTZ</b>	<b>0</b>	<b>0</b>	<b>20</b>
<b>K FELDSPAR</b>	<b>5</b>	<b>0</b>	<b>40</b>
<b>PLAGIOCLASE FELDSPAR</b>	<b>55</b>	<b>45</b>	<b>30</b>
<b>MAFIC MINERALS</b>	<b>40</b>	<b>55</b>	<b>10</b>

**(i) Name the compositional groups for rocks J, K and L.**

**J \_\_\_\_\_ K \_\_\_\_\_**

**L \_\_\_\_\_ [2]**

**(ii) Define the term mafic minerals.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(iii) Explain the difference between the percentage of quartz and the percentage of silica in a rock.**

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[2]

**(iv) Igneous rocks can be classified by using the percentage of silica or the percentage of quartz. Which of these methods is easier to use with hand specimens? Explain your answer.**

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[2]

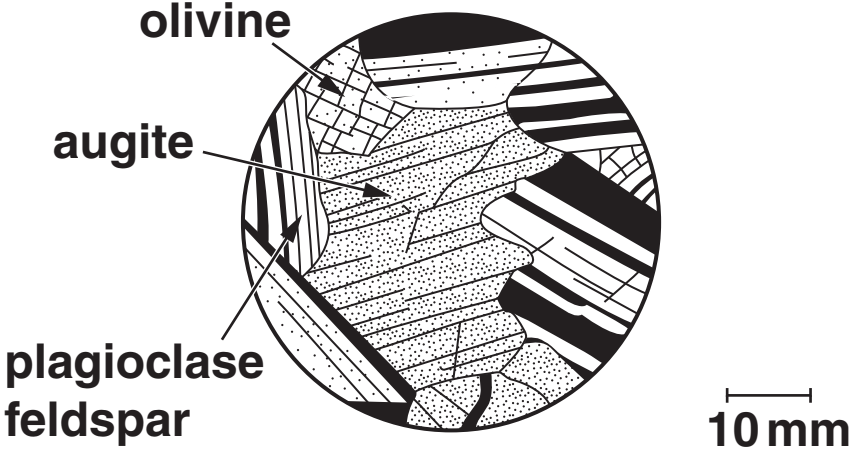
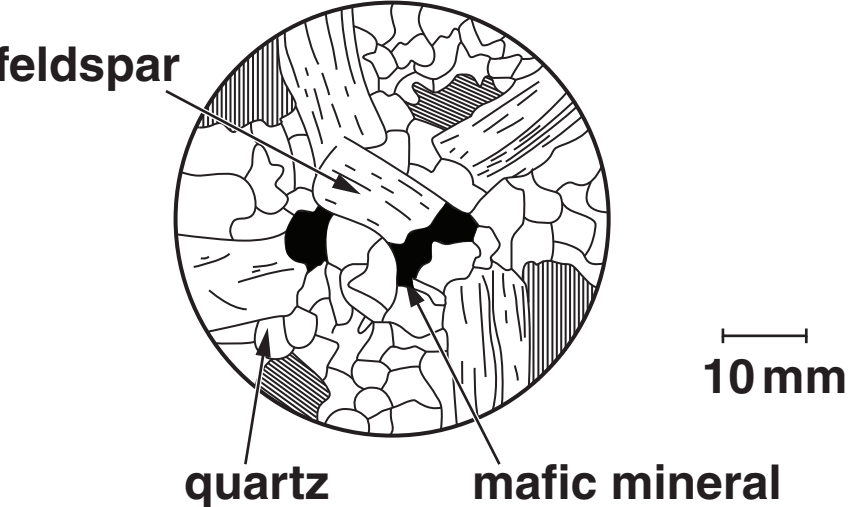
**(c) Match the rock names to the correct descriptions or thin section drawings.**

**ANDESITE  
GABBRO**

**BASALT  
GRANITE**

**DOLERITE  
OBSIDIAN**

**DIORITE  
RHYOLITE**

DESCRIPTION	ROCK NAME
intermediate with fine crystal grain size	
medium crystal grain size and black colour	
fine grained and a light grey colour with flow banding	
coarse crystal grain size with black biotite and hornblende and white plagioclase	
 <p>olivine</p> <p>augite</p> <p>plagioclase</p> <p>feldspar</p> <p>10 mm</p>	
 <p>feldspar</p> <p>quartz</p> <p>mafic mineral</p> <p>10 mm</p>	

[6]

[Total: 17]

- 6 **Describe the deposition and characteristics of conglomerates, sandstones and mudstones on beaches and in sediment-rich shallow seas. You may use diagrams to illustrate your answer.**

 **In your answer you should make clear how the formation of the rocks and their environment are related.**

### **Deposition and characteristics of conglomerates**

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[10]

[Total: 10]

- 7 Describe the processes that operate in the rock cycle to form each of the main groups of rocks. You may use diagrams to illustrate your answer.**



**In your answer you should make clear how the rock groups and processes are linked to the rock cycle.**

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[10]

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**END OF QUESTION PAPER**

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