



ADVANCED SUBSIDIARY GCE
GEOLOGY
 Rocks – Processes and Products

F792

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:

- Electronic Calculator
- Ruler (cm/mm)

Thursday 27 May 2010
Afternoon

Duration: 1 hour 45 minutes



Candidate Forename		Candidate Surname	
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Centre Number							Candidate Number			
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INSTRUCTIONS TO CANDIDATES

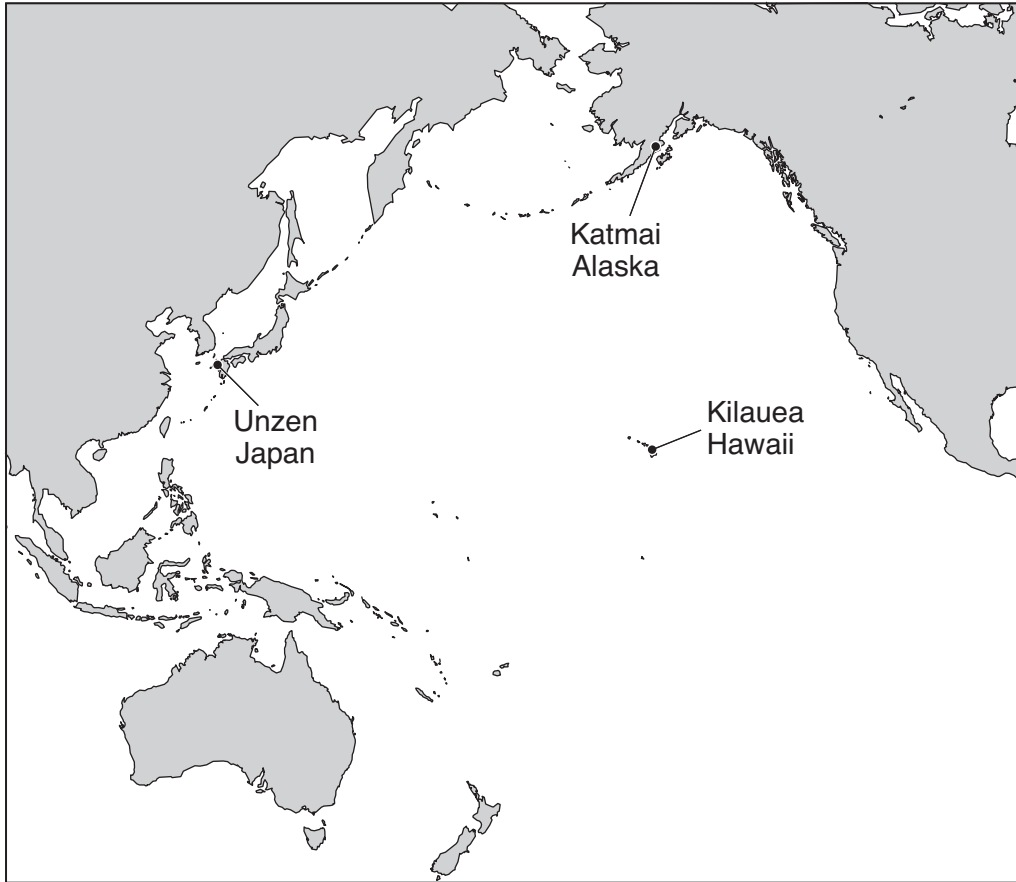
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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.
- This document consists of **16** pages. Any blank pages are indicated.

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

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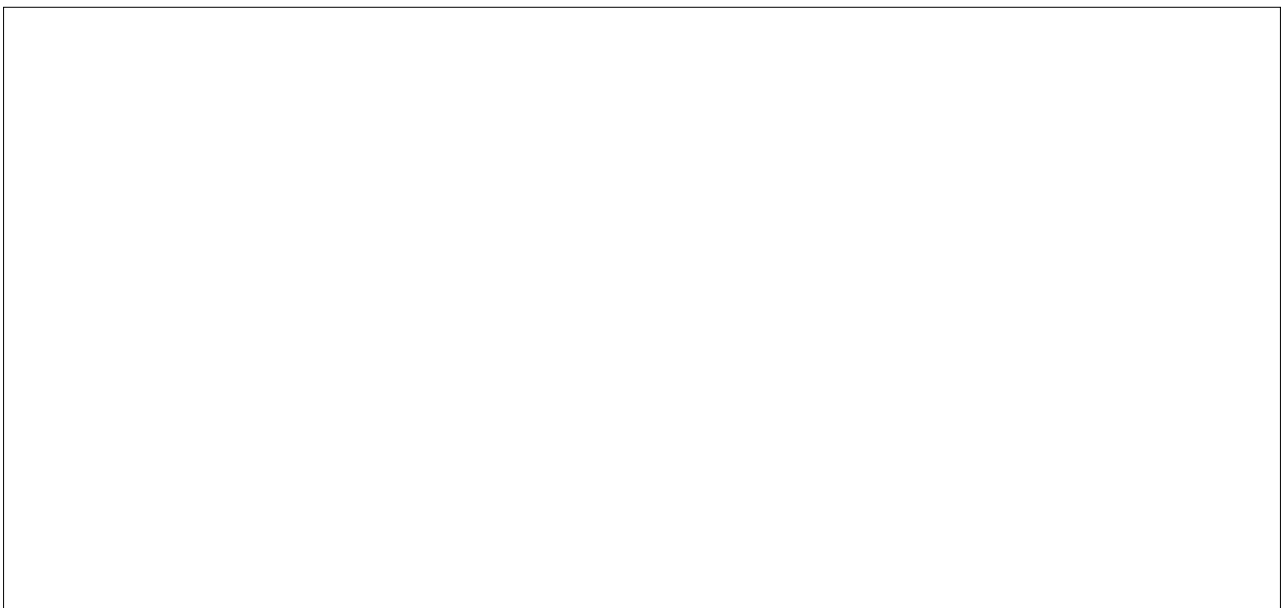
..... [3]

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 with the aid of a labelled diagram(s) how a caldera forms.



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..... [4]

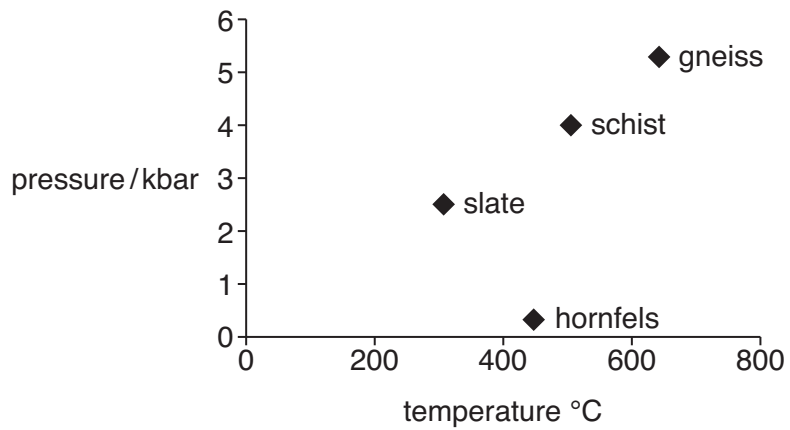
(e) Describe what a geyser is.

.....
..... [1]

[Total: 16]

Turn over

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.

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

[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.

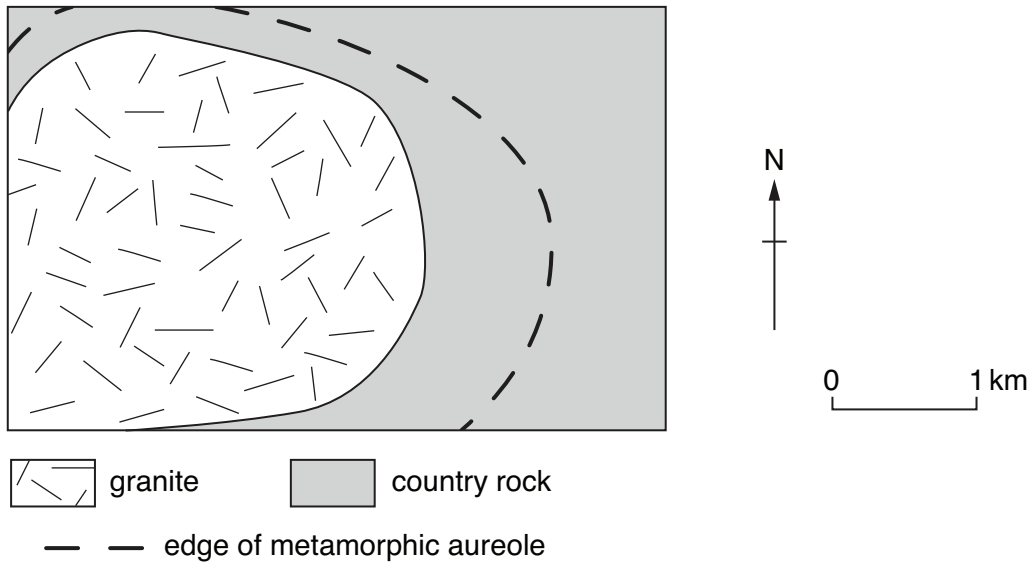
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..... [2]

(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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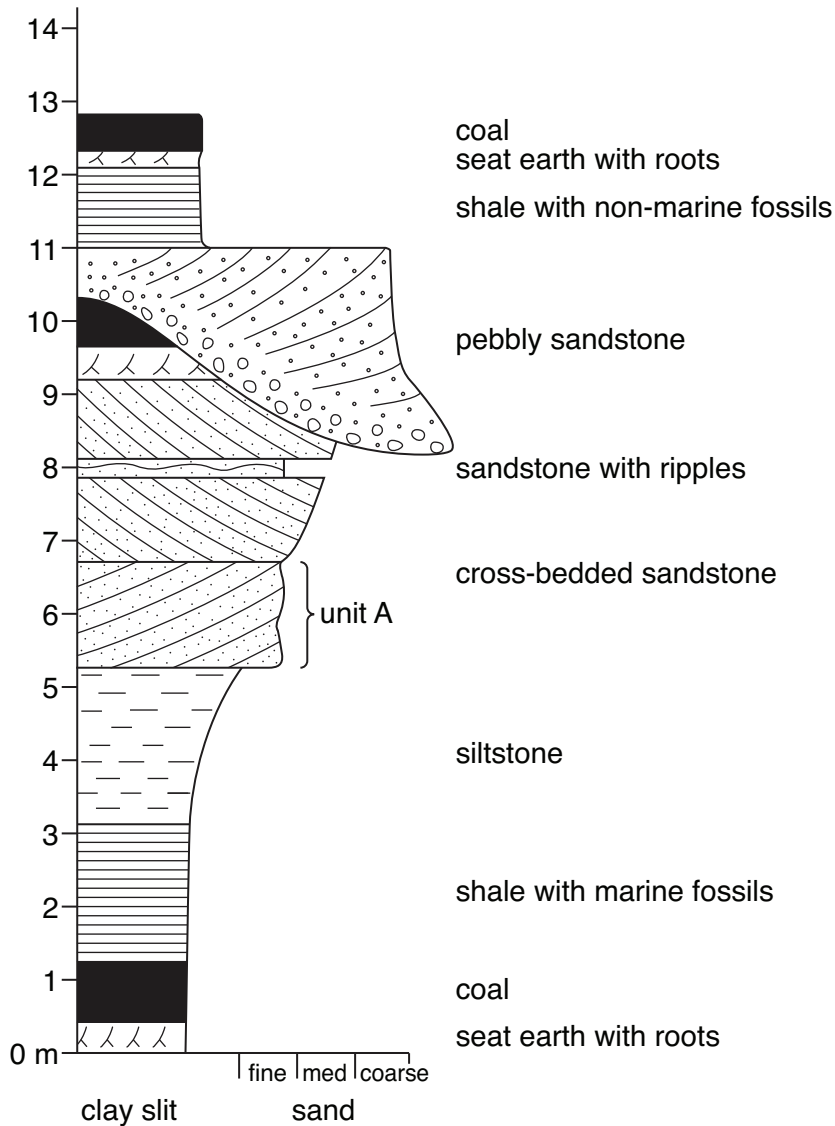
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..... [2]

[Total: 15]

3 The diagram below is a graphic log through a sequence of sedimentary rocks.



(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.

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 [2]

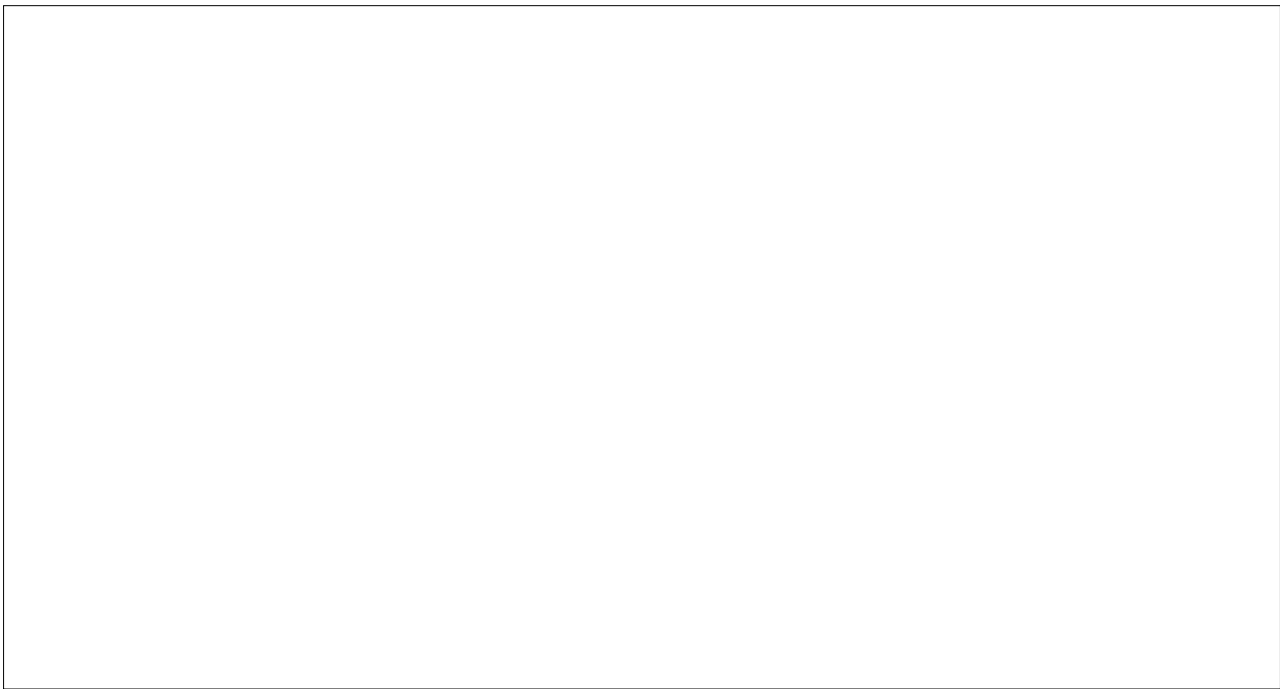
(v) Explain why the base of the pebbly sandstone is drawn at an angle.

.....
..... [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.

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..... [4]

(c) (i) Describe with the aid of a labelled diagram how cross bedded sandstones are formed.



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..... [3]

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

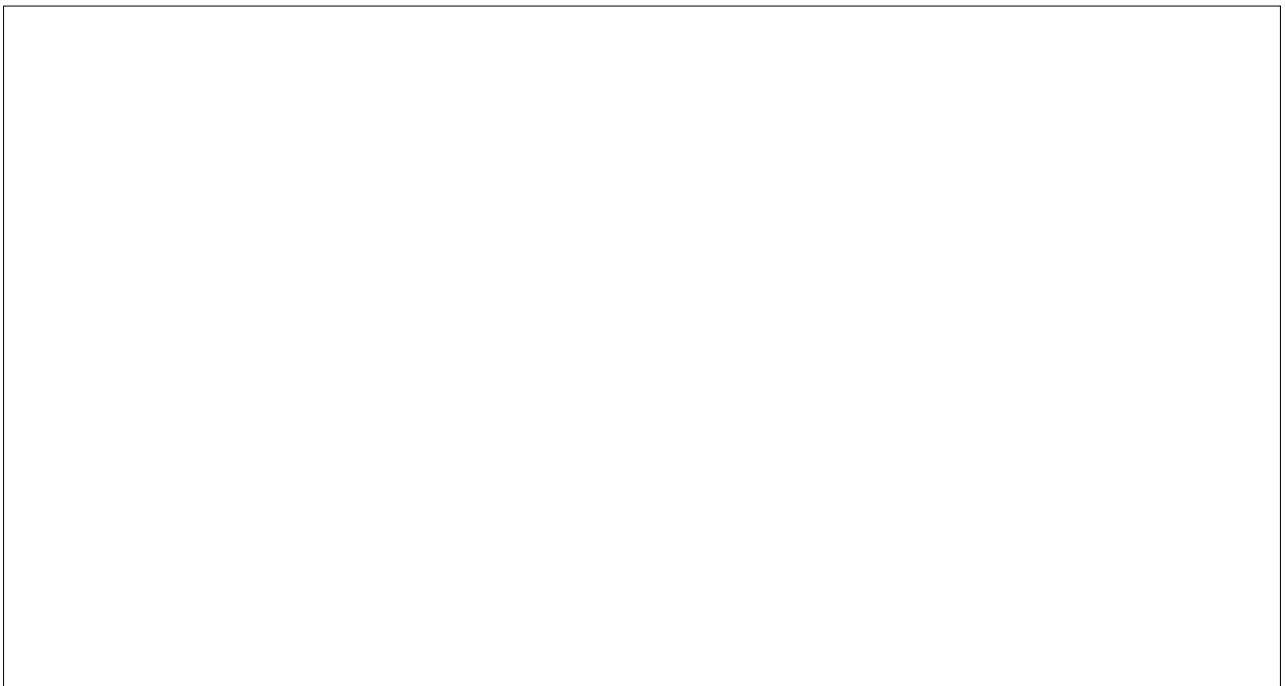
23°	28°	35°
18°	32°	30°
11°	24°	27°
15°	14°	19°

average dip° [1]

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

.....
..... [1]

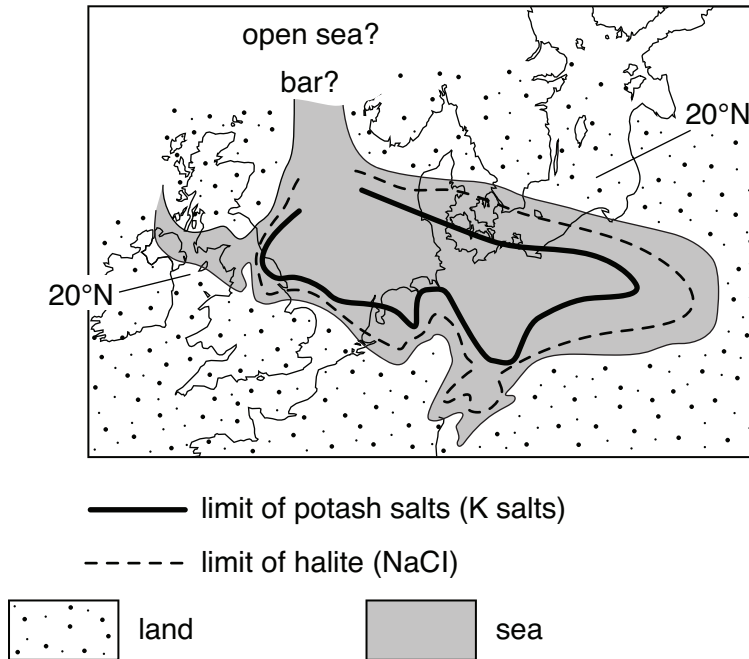
(d) Describe with the aid of a labelled diagram how ripple marks are formed in a river.



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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.



- (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.

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..... [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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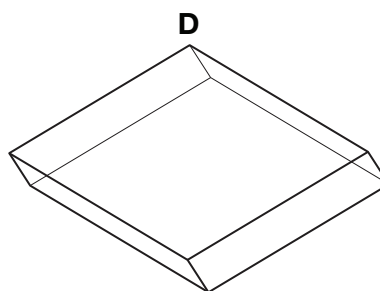
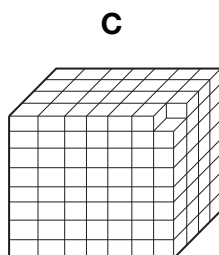
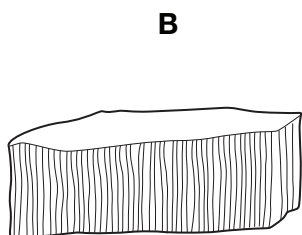
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..... [2]

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

specific gravity	crystal system and cleavage	hardness	composition	colour	name
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 ₄	white	anhydrite
2.2	fibrous layers	2	CaSO ₄ ·2H ₂ O	white or pink	gypsum
2.8	massive or rhombohedral but faces are often curved	3.5	CaMg(CO ₃) ₂	white	dolomite
2.7	massive or rhombohedral with three planes of cleavage so cleaves into smaller rhombs	3	CaCO ₃	white	calcite

(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.

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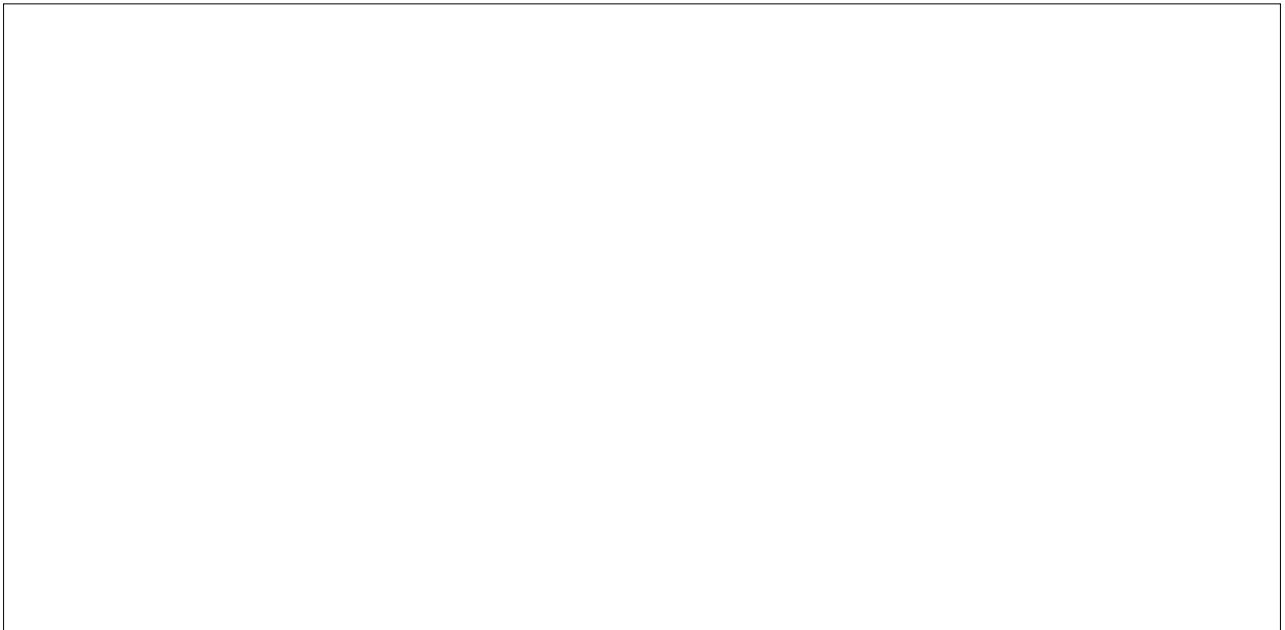
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..... [2]

(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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.....
..... [2]

(c) Describe how desiccation cracks form around the edge of a shallow sea like the Zechstein Sea. Use diagrams in your answer.



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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
SiO₂%	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.

mineral	rock J %	rock K %	rock L %
quartz	0	0	20
K feldspar	5	0	40
plagioclase feldspar	55	45	30
mafic minerals	40	55	10

(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.

.....

 [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]

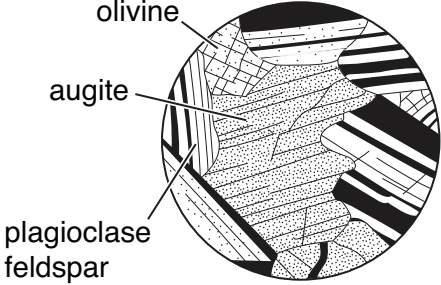
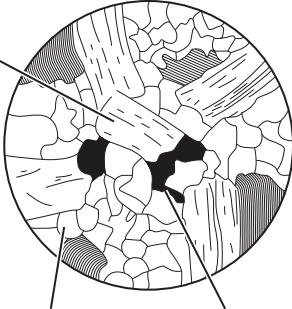
(c) Match the rock names to the correct descriptions or thin section drawings.

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	
	
	

[6]

[Total: 17]

Turn over

