

**ADVANCED SUBSIDIARY GCE**  
**GEOLOGY**  
Rocks – Processes and Products

**F792**

Candidates answer on the question paper.

**OCR supplied materials:**

None

**Other materials required:**

- Ruler (cm/mm)
- Protractor
- Electronic calculator

**Wednesday 19 January 2011**  
**Morning**

**Duration: 1 hour 45 minutes**




Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

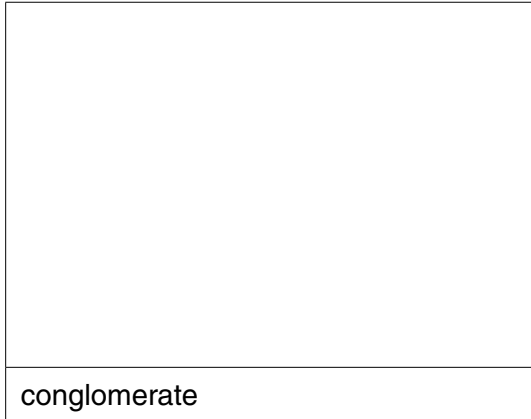
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Answer **all** the questions.
- Do **not** write in the bar codes.

**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 a mark 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 **20** pages. Any blank pages are indicated.

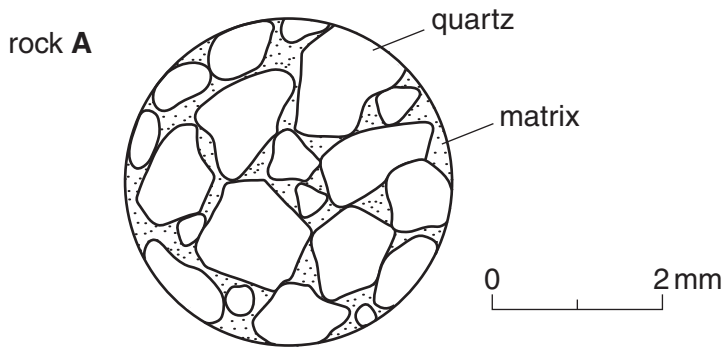
Answer **all** the questions.

- 1 (a) In the boxes below, draw diagrams to show the difference between a conglomerate and a breccia. Add a scale to both diagrams.



[2]

- (b) The thin section diagram below shows sedimentary rock **A**.



- (i) Explain the terms:

sedimentary rock .....

.....

matrix. ....

..... [2]

- (ii) Name and describe sedimentary rock **A**, shown above, using technical terms.

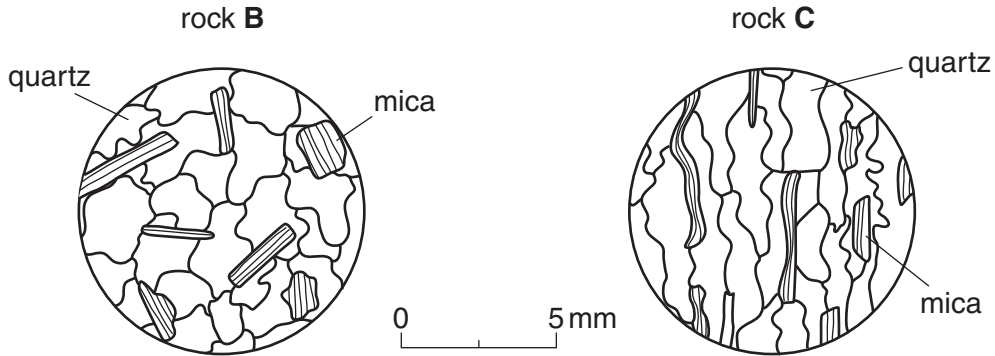
name .....

grain size .....

grain shape.....

sorting ..... [3]

(c) The thin section diagrams below show metamorphic rocks that have formed from the sedimentary parent rock **A**.

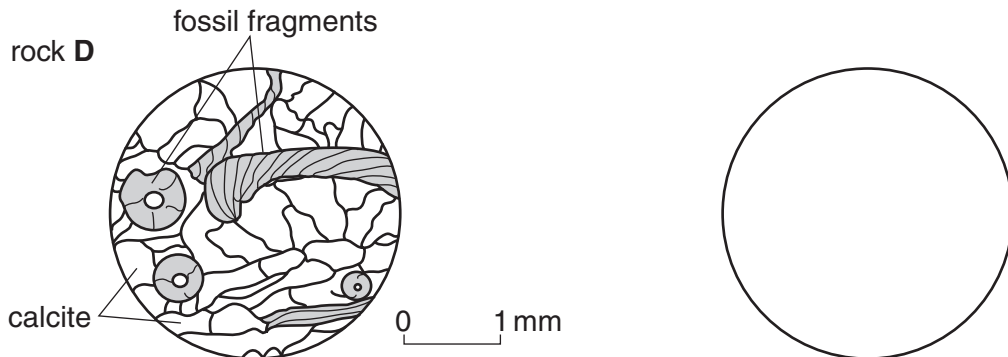


Complete the table below to identify the type of metamorphism and the pressure conditions under which rocks **B** and **C** developed from parent rock **A**.

	rock B	rock C
type of metamorphism		
pressure		

[3]

(d) Rock **D** is a sedimentary rock.



(i) Identify and describe rock **D** using technical terms.

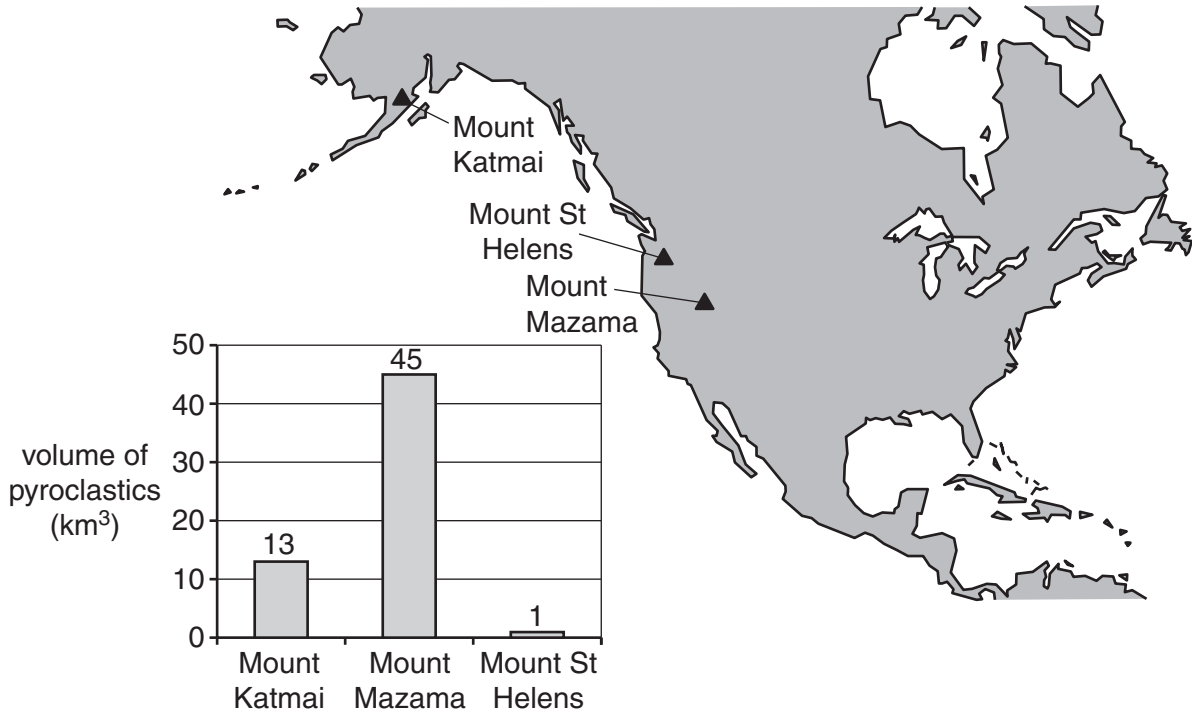
identification .....

description..... [2]

(ii) In the circle above, draw and label the metamorphic rock that will form from parent rock **D**. [2]

[Total: 14]

2 The map below shows the location of three volcanoes in North America. Bar charts show the volume of pyroclastics that were produced the last time each volcano erupted.



(a) (i) Circle a volcanic island arc. [1]

(ii) Which of the three eruptions shown was the most violent? Explain your answer.

volcano .....

..... [2]

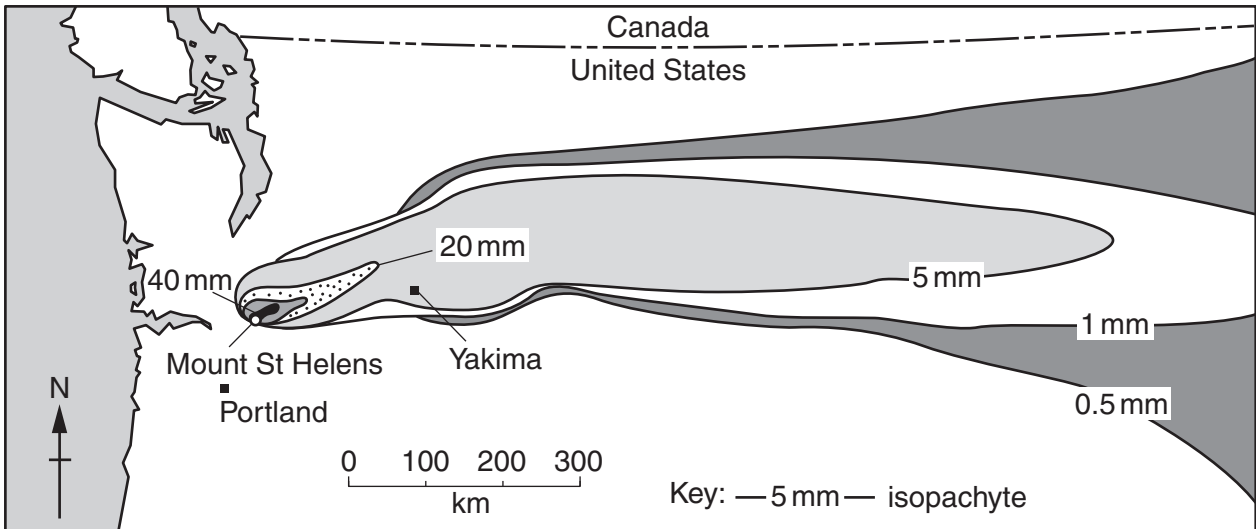
(b) (i) The 1912 eruption of Mount Katmai generated lava with a silica content of 69%. Name the rock produced.

..... [1]

(ii) Describe the pyroclastic products that the eruption of Mount Katmai may also have produced.

..... [3]

(c) The isopachyte map below shows the thickness and pattern of ash fall around Mount St Helens, produced by the 1980 eruption.



(i) What is the maximum distance from the volcano where the ash fall would have been 20 mm thick?

distance ..... km [1]

(ii) Describe and explain the pattern of ash fall around Mount St Helens produced by the 1980 eruption.

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

(iii) Why were the residents of Portland 'lucky' on this occasion compared to Yakima?

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

(iv) Describe where you would expect the coarsest pyroclastic particles to be found.

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

(v) Mount St Helens is being regularly monitored. Describe **two** monitoring methods and how they may give warning of a new eruption.

1 .....

.....

.....

.....

.....

.....

2 .....

.....

.....

.....

..... [4]

(d) Mount Mazama erupted 6845 years ago. The eruption produced a caldera that now contains Crater Lake.

(i) Draw a labelled cross section diagram to show the final caldera.



[2]

(ii) List the stages of volcanic activity that formed the caldera.

.....

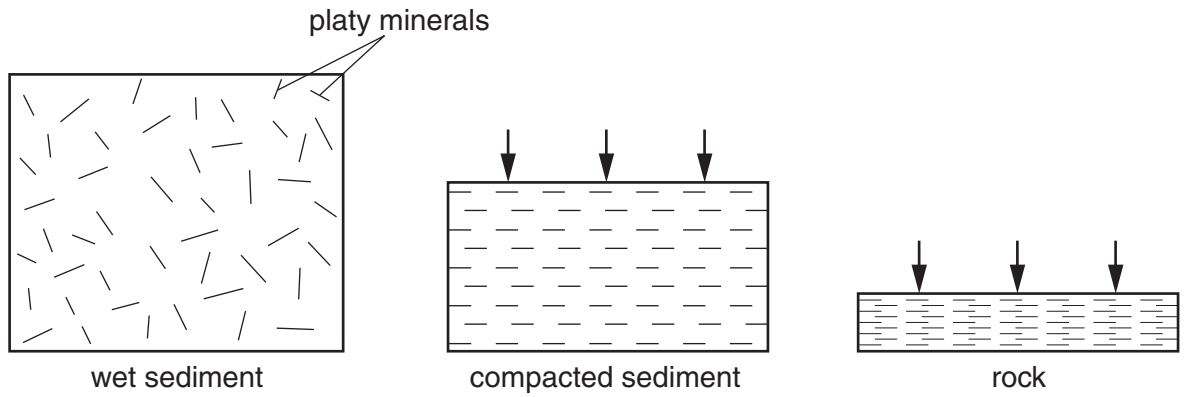
.....

.....

..... [2]

[Total: 20]

3 (a) The diagrams below show the diagenesis of a muddy sediment.



(i) Suggest a suitable platy mineral.

..... [1]

(ii) What substance is lost from the sediment as it is compacted?

..... [1]

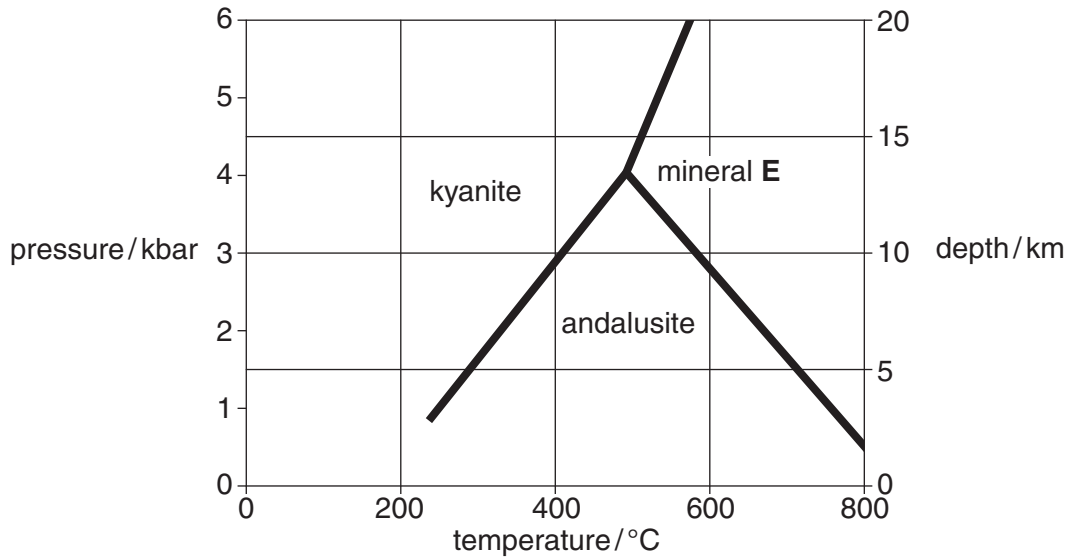
(iii) Identify the rock that is produced after diagenesis is complete.

..... [1]

(iv) Describe the process, shown in these diagrams, that formed the rock.

.....  
.....  
.....  
.....  
.....  
.....  
..... [3]

(b) The pressure and temperature graph below shows the stability fields of a group of minerals whose chemical composition is  $Al_2SiO_5$ .



(i) Name mineral E.  
 ..... [1]

(ii) State the temperature and pressure of formation, if these minerals all exist in the same rock.  
 temperature .....°C pressure .....kbar [1]

(iii) **On the graph**, draw a line, starting from the origin, representing a temperature gradient of 35°C/km. [1]

(iv) Use the graph to identify the minerals which are likely to form where the temperature gradient is 35°C/km.  
 ..... and ..... [1]

(v) Name the likely rock types that these minerals, shown on the graph, will be found in. Explain your answer.  
 rock types ..... and .....  
 explanation .....  
 ..... [2]

(c) Shade on the pressure temperature graph where diagenesis occurs. [1]



- (d) Complete the table of metamorphic terms below by writing the correct number from the list in each of the spaces.

metamorphic term	definition
index mineral	
	a line on a map joining points of equal metamorphic grade
	a measure of the intensity of metamorphism
polymorph	

**list**

1	metamorphic grade
2	metamorphic zone
3	a mineral stable under a specific temperature and pressure range
4	isograd
5	a mineral that has the same composition but occurs in different crystal forms
6	a mineral that has grown after the groundmass has developed

[4]

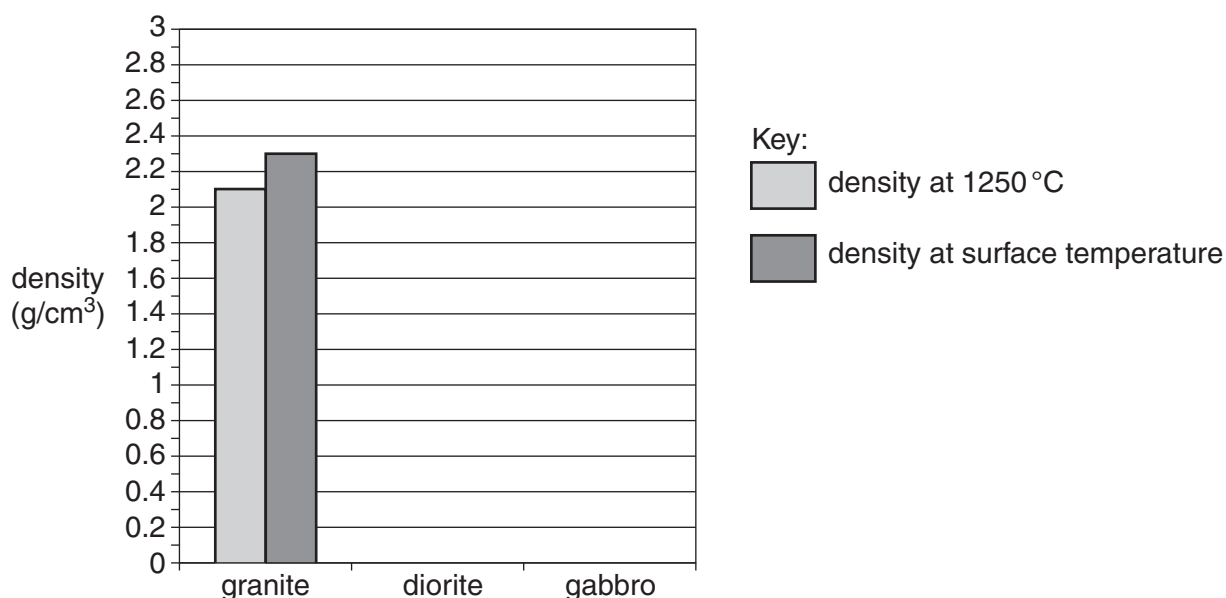
[Total: 17]

4 The density of magma is important to the method of intrusion.

The data in the table below was obtained in the laboratory by experimentally melting rocks.

	density of magma at 1250°C (g/cm <sup>3</sup> )	density of rock at surface temperature (g/cm <sup>3</sup> )
granite	2.1	2.3
diorite	2.2	2.6
gabbro	2.7	2.8

(a) (i) Plot the bar graph for diorite and gabbro. Granite has already been plotted. [2]



(ii) Which magma is most likely to rise up through the crust?  
 ..... [1]

(iii) Explain why the density is lower at 1250°C than at the surface temperature.  
 ..... [1]

(iv) The density data measured at surface temperature in the laboratory is accurate but the data for 1250°C may not be very accurate. Explain what other variable will affect the data.  
 ..... [1]

(b) Complete the tables below for granite and gabbro to show:

- the silica percentage
- the mineral content. K feldspar has been completed.

	granite	gabbro
(i) silica percentage (%)		

[1]

(ii) augite		
Ca rich plagioclase feldspar		
K feldspar	✓	
Na rich plagioclase feldspar		
quartz		

[3]

(iii) State one characteristic textural feature that both these rocks have in common.

..... [1]

(c) (i) Name the type of major intrusion formed when silicic magma crystallises in the crust.

..... [1]

(ii) The average density for sedimentary rocks in the crust is about 2.5 gm/cm<sup>3</sup>. Describe with the help of a diagram how the silicic magma rises through the continental crust. Use the terms **stopping** and **assimilation** in your answer.

.....

.....

.....

..... [4]

[Total: 15]

Turn over

5 Deposition in hot deserts occurs in several very different environments.

(a) Describe how flash floods can form poorly sorted conglomerates in deserts.

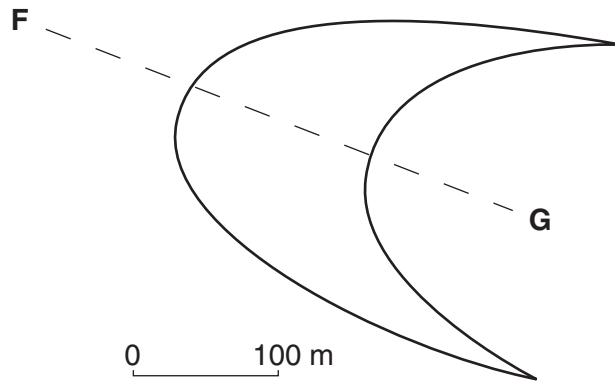
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..... [2]

(b) Sandstones form in dunes in the desert. The diagram below shows a plan view of a dune.



(i) Label on the diagram above, the direction of the prevailing wind. [1]

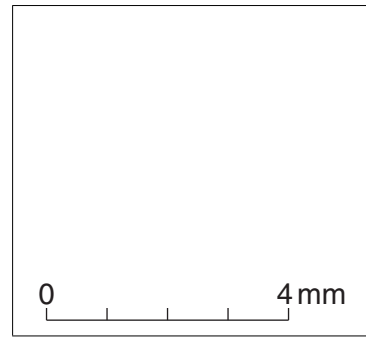
(ii) Draw a cross section between **F** and **G**, showing as accurately as possible the angles of slopes of the dune.

[1]

(iii) On your cross section, show the internal stratification of the dune. [1]

(iv) List and draw the characteristics of a sandstone that forms in a dune.

.....  
.....  
.....  
.....



[4]

(c) Evaporites form in playa lakes in the centre of desert drainage basins.

(i) Explain where the salts that form the evaporites come from.

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

(ii) State the sequence of evaporites that forms in a playa lake.

first to form .....  
.....  
.....

last to form ..... [2]

(d) Describe the climatic conditions in which desert sediments form.

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

[Total: 14]

- 6 Describe with the aid of labelled diagrams, the formation of desiccation cracks, salt pseudomorphs, graded bedding and ripple marks.



*In your answer you should make clear how the sedimentary structures form in different environments.*

desiccation cracks

.....

.....

.....

.....

.....

salt pseudomorphs

.....

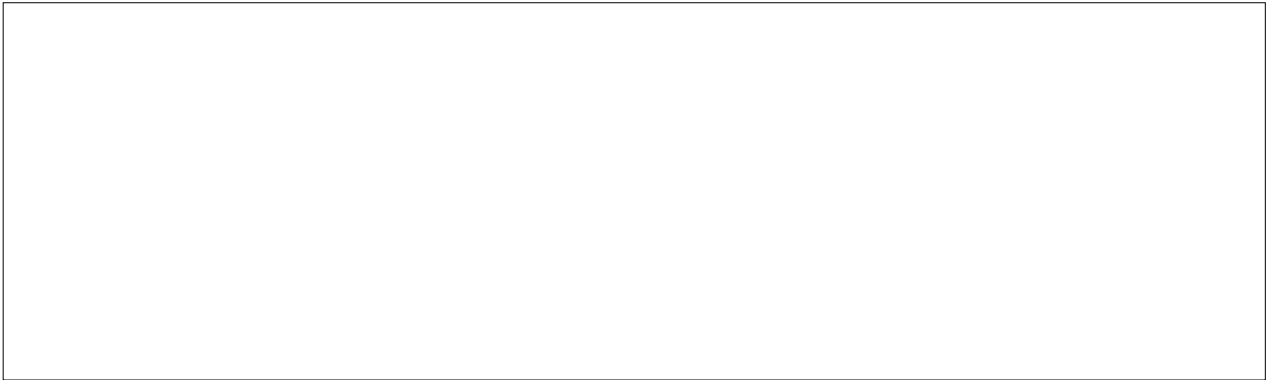
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.....

.....

.....

graded bedding



.....

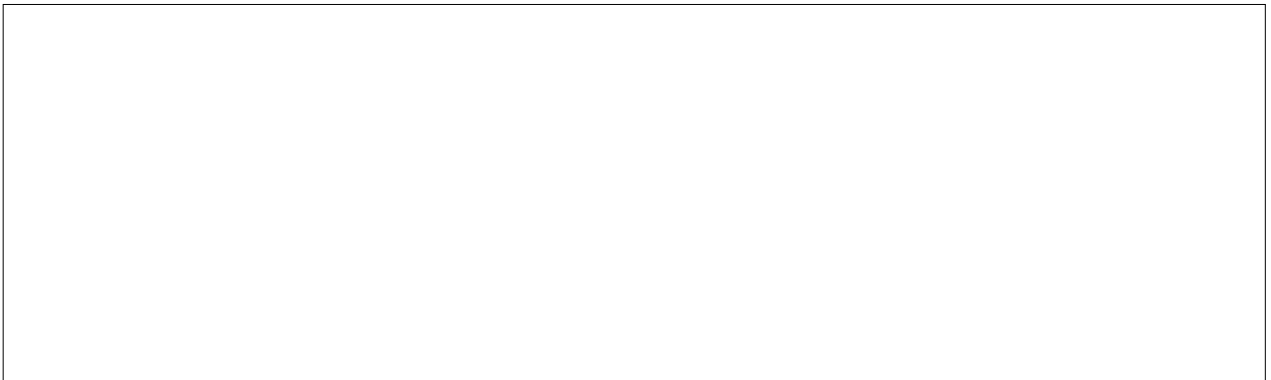
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ripple marks



.....

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.....

..... [10]

[Total: 10]

**QUESTION 7 STARTS ON PAGE 16**

7 Describe and explain the processes operating in the rock cycle **at the surface**. You may use diagrams to illustrate your answer.



*In your answer you should make clear how the processes link to the products.*

A series of 20 horizontal dotted lines provided for writing the answer.









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