

Wednesday 22 May 2013 – Morning

AS GCE GEOLOGY

F792/01 Rocks – Processes and Products

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:

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

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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.
- 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.
-  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.
- The total number of marks for this paper is **100**.
- This document consists of **20** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 (a) The table below shows characteristic features of three sandstones that formed in desert, shallow sea and fluvial environments.

Feature	Sandstone A	Sandstone B	Sandstone C
grain shape	rounded	sub-rounded	well-rounded
colour	yellow	grey	red
sorting	moderate	poor	well
mica present	yes	yes	no
calcite present	yes	no	no
contains rock fragments	no	yes	no

- (i) State the main mineral that forms sandstone.

..... [1]

- (ii) Draw a single grain in each box to show the difference in grain shape between well-rounded and sub-rounded grains.

well-rounded	sub-rounded

[1]

- (iii) Identify the most likely environment (desert, shallow sea or fluvial) in which each of the sandstones in the table was formed. Give a reason for your choice of each environment.

A

.....

B

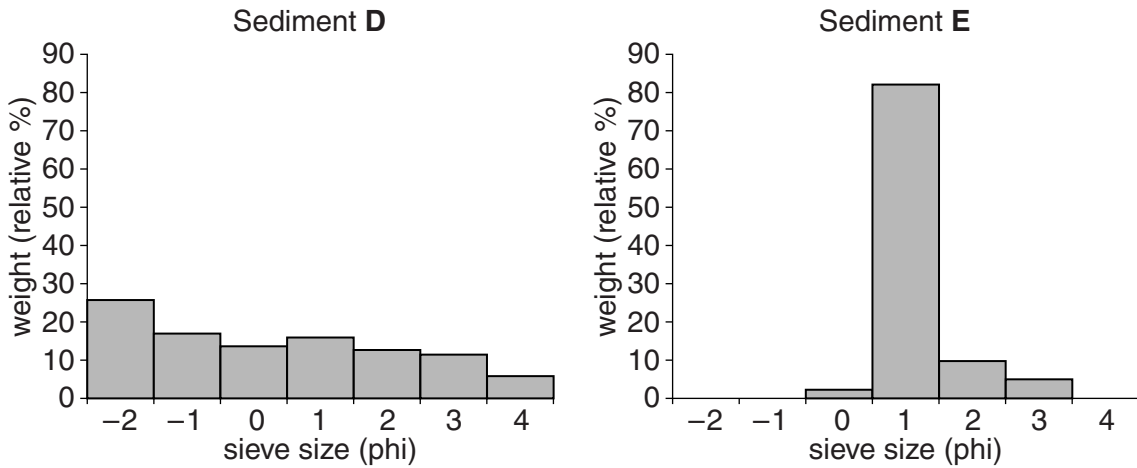
.....

C

.....

[3]

(b) The bar charts below show data from two sediments, **D** and **E**, that have been sieved. The -2 (phi) sieve contains the coarsest particles.



(i) Compare the degree of sorting between the two sediments **D** and **E**.

.....
 [1]

(ii) Using the data from the bar charts, identify possible environments of deposition for sediments **D** and **E**. Give a reason for each answer.

D

.....

E

..... [2]

(c) Fully describe the rock in the thin section below and identify it.

.....

.....

.....

.....

.....

.....

.....

.....

main mineral

rock fragment

sand and silt matrix (dark red colour)

K feldspar (pink in colour)

0 1 mm

rock identification [4]

[Total: 12]

Turn over

2 The data below shows the mineral composition of three igneous rocks.

Rock F		Rock G		Rock H	
mineral	%	mineral	%	mineral	%
augite (pyroxene)	25	quartz	25	augite (pyroxene)	20
olivine	20	K feldspar	45	plagioclase	65
Ca rich plagioclase	55	Na rich plagioclase	17	hornblende	15
		micas	13		

(a) (i) Identify the igneous rock groups to which rocks **F**, **G** and **H** belong.

rock **F**..... rock **G**.....

rock **H**..... [2]

(ii) Rock **F** has an average crystal grain size of 0.5 mm. The augite is found as 4 mm crystals in a fine groundmass of crystals. Fully name rock **F**.

..... [2]

(iii) Explain how the texture of rock **F** formed.

.....

 [2]

(iv) Rock **G** has an average crystal grain size of 12 mm and the minerals can be identified easily. Name rock **G**.

..... [1]

(v) Use Bowens Reaction Series to help explain the difference in chemical composition between the plagioclase feldspars in rocks **F** and **G**.

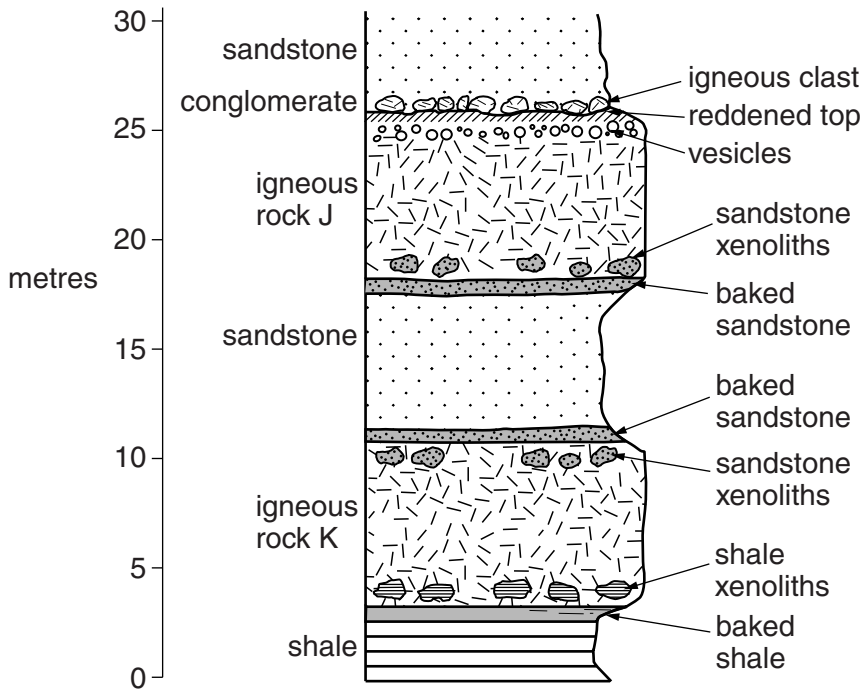
.....
 [1]

(b) Rock **H** has amygdaloidal texture. Draw a labelled diagram to show this texture.



[2]

(c) The diagram below shows a sequence of sedimentary rocks and igneous rocks in a cliff section.



(i) Identify the igneous features formed by rocks **J** and **K**.

J **K** [1]

(ii) Describe **three** characteristics that allowed you to identify the igneous feature formed by rock **J**.

.....

 [3]

(iii) Describe **two** characteristics that allowed you to identify the igneous feature formed by rock **K**.

.....

 [2]

[Total: 16]
 Turn over

3 (a) (i) Define the term *weathering*.

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

(ii) Name the main chemical weathering process that causes changes in granite.

..... [1]

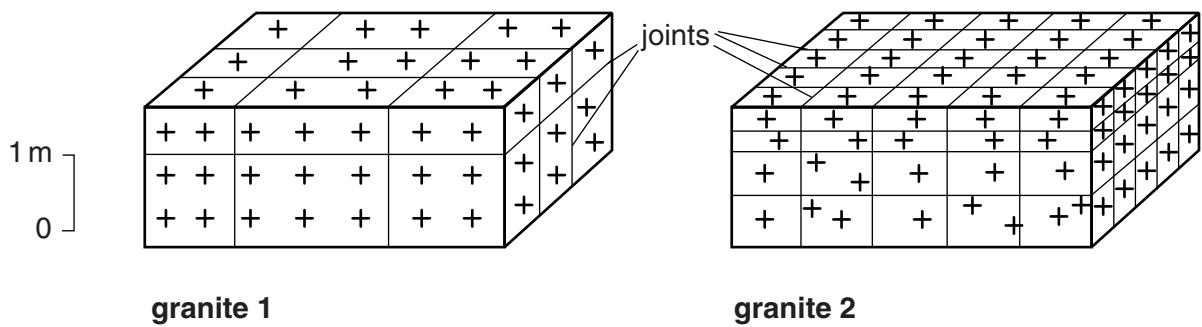
(iii) When granite is weathered, clay is one of the products. Describe how the clay forms.

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

(iv) Explain why quartz is almost unaffected by weathering.

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

(b) The block diagrams below show jointed granites.

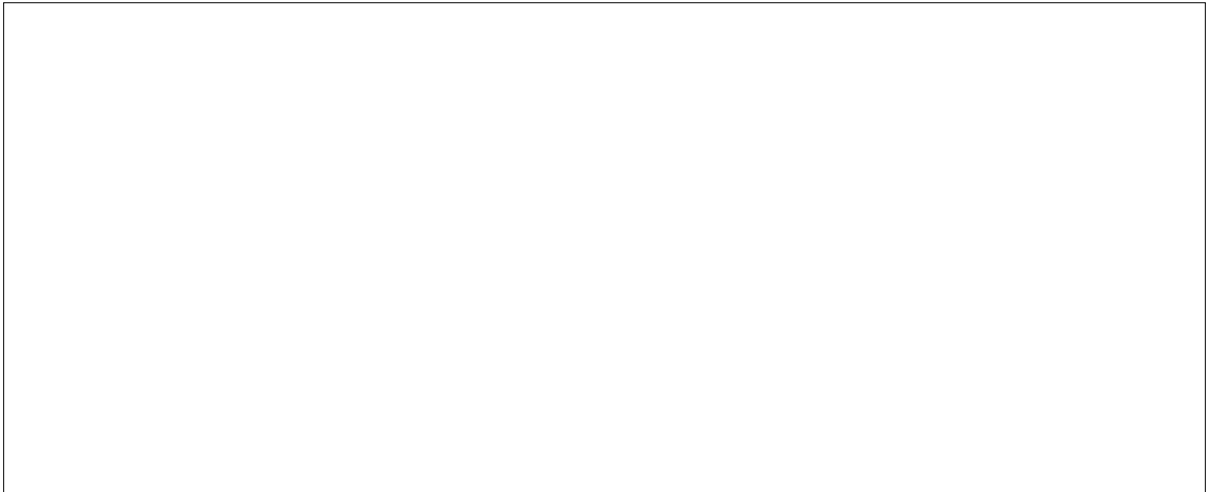


Which of the granites is more susceptible to weathering? Explain your answer.

Granite most susceptible to weathering

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

(c) Describe with the help of labelled diagram(s) how frost shattering operates on rocks.



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

(d) Describe how exfoliation affects rocks.

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

(e) State **two** methods of biological weathering.

1
2 [2]

[Total: 15]

- 4 (a) Volcanoes produce a range of products. Complete the table by writing the correct product name chosen from the list below.

volcanic products

aa lava
pahoehoe lava

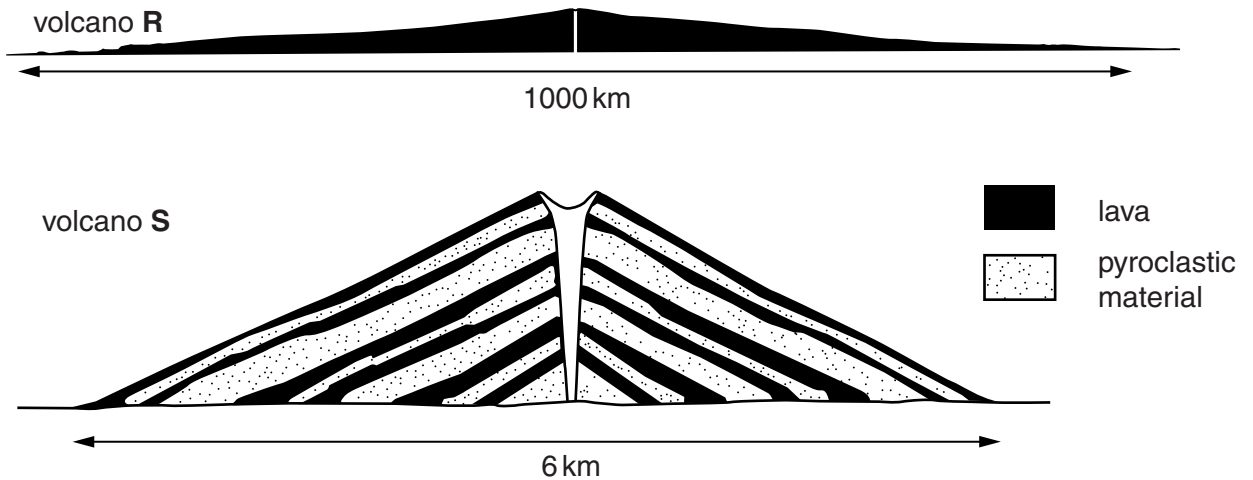
agglomerate
pillow lava

ignimbrite
tuff

	Description	Volcanic product
L	pyroclastic rock formed from consolidated ash	
M	basalt flow with a smooth ropy pattern on the surface	
N	coarse pyroclastic rock with large angular blocks	
P	basalt with globular shapes and rounded tops	
Q	pumice rich pyroclastic flow deposit	

[5]

- (b) The diagrams below show the relative shape and size of two volcanoes.



- (i) Identify the types of volcano shown in the diagrams.

volcano R

volcano S

[2]

- (ii) Label on volcano S:

- a crater
- a vent.

[2]

(iii) State the plate tectonic settings where you would expect to find volcanoes **R** and **S**.

volcano **R**

volcano **S** [2]

(iv) Explain how the shape of these volcanoes is controlled by the composition of the lava.

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

(c) Describe how volcanic activity can affect the climate.

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

(d) Explain how the following methods are used to help predict volcanic activity:

(i) changes in gas emissions

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

(ii) changes in ground level

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

(iii) increased seismic activity.

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

[Total: 19]

10
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5 (a) In 1929 a turbidity current, triggered by an earthquake, broke a number of submarine telephone cables that had been laid on the continental slope and on the abyssal plain of the Atlantic Ocean.

(i) Describe a turbidity current.

.....
 [1]

The table shows the time between the cable breaks after an earthquake which occurred at 0 minutes.

Cable number and position	Distance between cable breaks (km)	Time between cable breaks (minutes)	Average velocity of the turbidity current (km/minute)
1. at the top of the continental slope 140 km from epicentre	140	59	
2. at the bottom of the continental slope 350 km from epicentre	210	124	1.69
3. on the abyssal plain 620 km from epicentre	270	358	0.75
4. on the abyssal plain 661 km from epicentre	41	77	

(ii) Calculate the average velocity of the turbidity current between the epicentre and cable 1.

..... km/minute [1]

(iii) Calculate the average velocity of the turbidity current between cable 3 and cable 4.

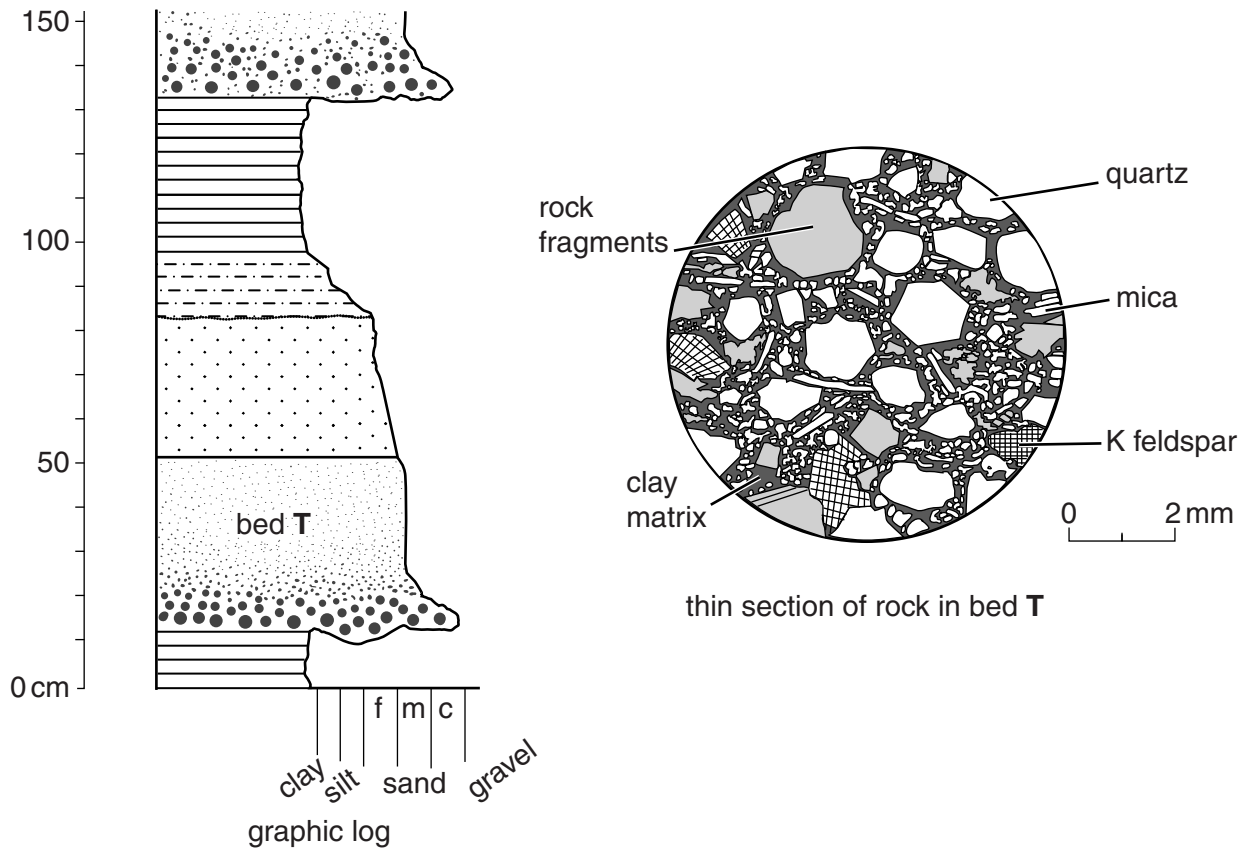
..... km/minute [1]

(iv) Use the data to explain why there is a change in the velocity of the turbidity current. Give **two** reasons.

.....

 [2]

(b) The graphic log below shows a commonly found sequence of sedimentary rocks that form in deep ocean basins. The thin section drawing shows the rock in bed T.



(i) Identify the part of the graphic log that was formed by a turbidity current. Use a bracket to clearly show the extent of the rocks formed by one turbidity flow. [1]

(ii) Use the thin section to identify the rock in bed T. Give a reason for your answer.

Rock identification

Reason

[2]

(iii) Name and describe the sedimentary structure that is seen in bed T.

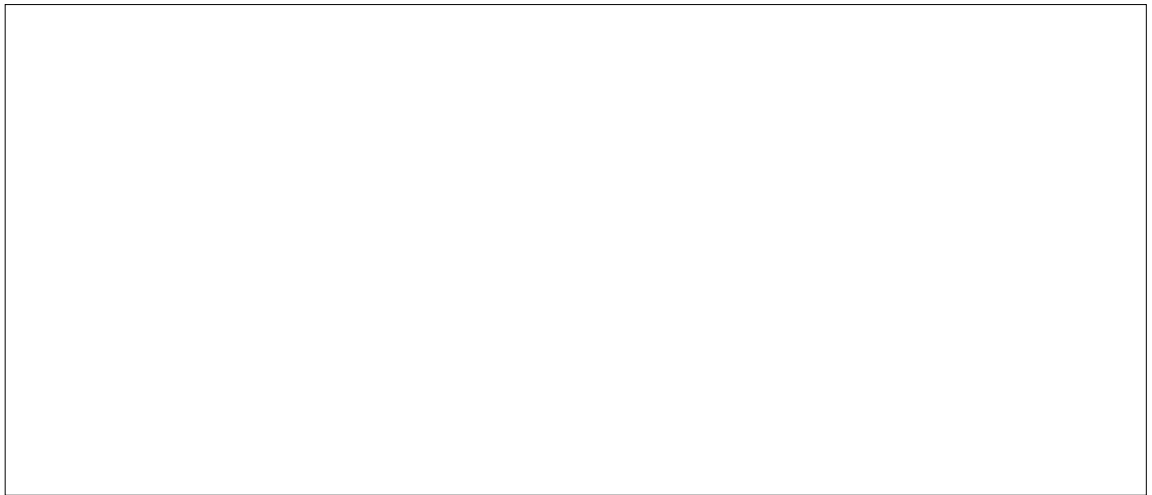
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[2]

(iv) Describe how the whole sequence shown in the graphic log formed. Include rock types and energy levels in your answer.

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

(v) Flute casts are found at the base of bed T. With the aid of a labelled diagram(s), explain how flute casts are formed.



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

(c) (i) Describe how calcareous and siliceous oozes form on the deep ocean floor.

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

(ii) Suggest a value for the likely rate of deposition for the oozes.

..... [1]

[Total: 18]

6 Describe how you would distinguish between igneous, sedimentary and metamorphic rocks.



In your answer you should make clear the distinguishing characteristics of each rock group.

[10]

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

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[Total: 10]

Question 7 begins on page 16

7 Describe how regional metamorphism of shales produces a sequence of rocks and minerals.



In your answer you should clearly link the correct rock types to metamorphic grade. [10]

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

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[Total: 10]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional answer space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.

This section of the page is a large, empty area of lined paper. It consists of approximately 25 horizontal dotted lines spaced evenly down the page. A solid vertical line runs down the left side of this area, creating a margin. The rest of the area is open for writing.

A vertical solid line is positioned on the left side of the page. From this line, a series of horizontal dotted lines extend across the page, creating a grid of writing space. There are 25 horizontal dotted lines in total, evenly spaced from top to bottom.

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