

**Wednesday 23 January 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

**Duration:** 1 hour 45 minutes

**MODIFIED LANGUAGE**




Candidate forename		Candidate surname	
Centre number		Candidate number	

**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) Sandstone is a clastic sedimentary rock made mainly of the mineral quartz.  
Define the terms *rock* and *mineral*.

rock .....

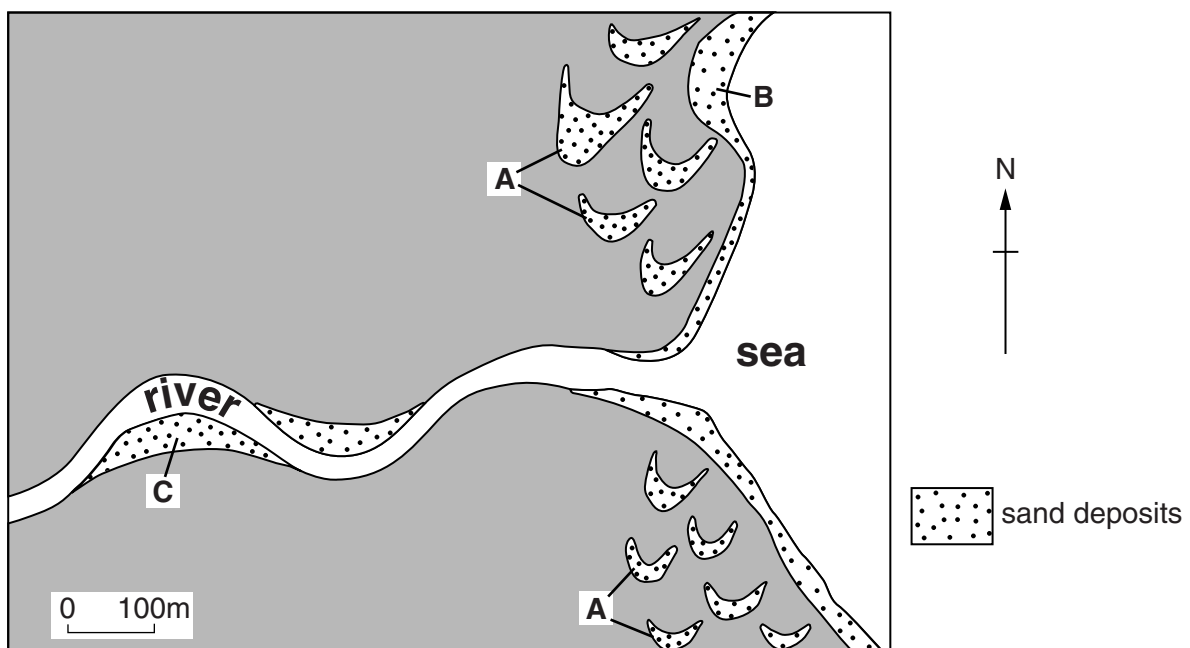
.....

mineral .....

.....

[2]

- (b) The map shows three different environments of deposition where sand is accumulating.



- (i) Identify the features at **A**.

..... [1]

- (ii) Name a sedimentary structure that could be found in feature **A**.

..... [1]

- (iii) Describe the environment at **C** in which the sand is deposited.

.....

..... [1]

- (iv) Match each of the sands described below to one of the environments of deposition **A**, **B** or **C** shown on the map.

Sand	Description	Environment A, B or C
1	sub-rounded, coarse, medium and fine sand sized quartz grains, with some muscovite mica and rock fragments	
2	rounded, medium size sand grains with a composition of 95% quartz with some calcite cement	
3	1 mm grains, well sorted and well rounded sand with a composition of 95% quartz with a few rock fragments	

[2]

- (c) Describe how unconsolidated sand becomes sandstone.

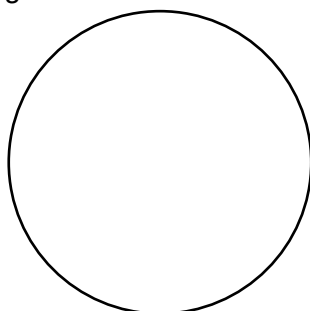
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..... [2]

- (d) Conglomerate formed from a river deposit.  
In the circle below draw a conglomerate and add a suitable scale.



[2]

- (e) The grains that form both the conglomerate and sandstone were transported in a river.  
Name and describe the methods that are used to transport these grains.

sandstone .....

.....

.....

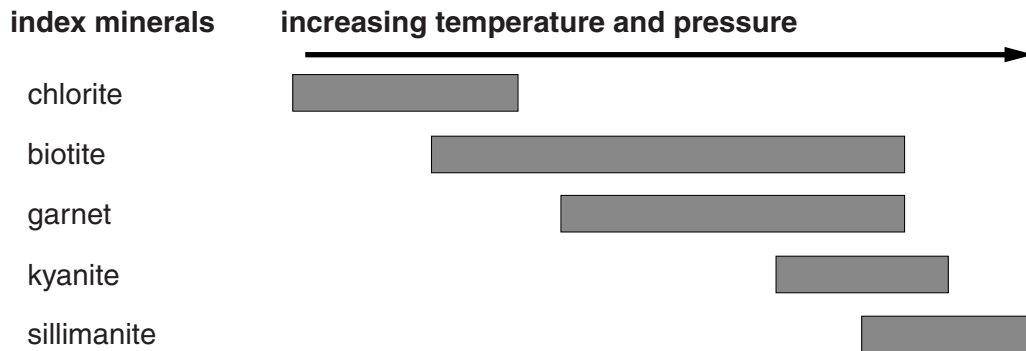
conglomerate .....

.....

..... [3]

[Total: 14]

- 2 The diagram below shows the index minerals that are found in metamorphic rocks at a range of temperatures and pressures.



- (a) (i) Define the term *index mineral*.

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

- (ii) Draw on the diagram above **two** vertical lines to show the limits of medium grade metamorphism. [1]

- (iii) What type of metamorphism produces this range of minerals?

..... [1]

- (iv) Identify the metamorphic rocks that are typical of low, medium and high grade metamorphism.

Grade	Metamorphic rock
Low	
Medium	
High	

[3]

- (v) State the parent rock from which these metamorphic rocks formed.

..... [1]

- (b) Describe **one** similarity and **one** difference between kyanite and sillimanite.

similarity .....

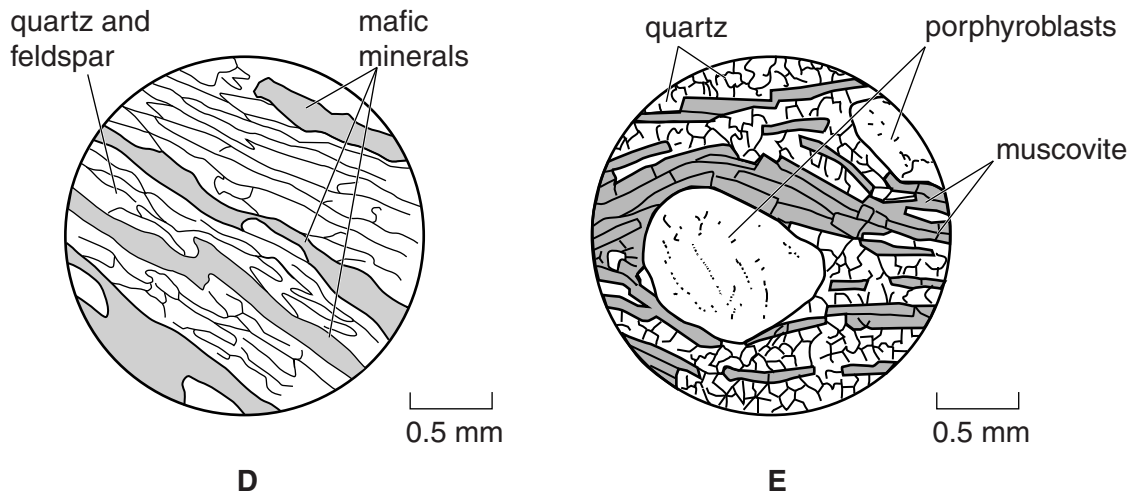
.....

difference .....

.....

[2]

(c) The thin section diagrams below show foliated metamorphic rocks.



(i) Label a crystal of garnet on the correct diagram. [1]

(ii) Identify the textures that are shown in the diagrams.

**D** .....

**E** ..... [2]

(d) (i) A garnet crystal has a hardness of 7 on Mohs' scale.  
Muscovite has a hardness of 2.5 on Mohs' scale.  
Describe how you would test these minerals for hardness.

..... [2]

(ii) Garnet has no cleavage. Muscovite has perfect cleavage.  
Explain the difference between these cleavage terms.

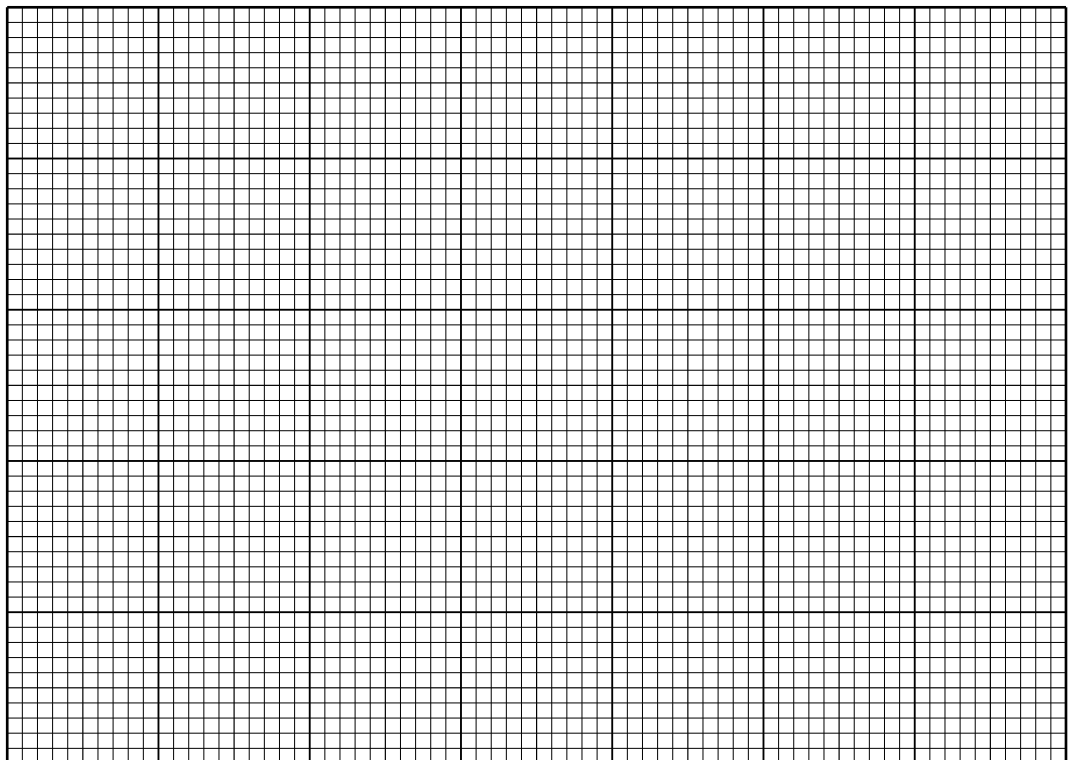
..... [2]

[Total: 16]

- 3 (a) (i) Plot a line graph to show how ash thickness changes with distance from a volcano.

Distance from volcano (km)	Ash thickness (mm)
1	50
100	25
250	10
350	4
400	3
650	1

ash  
thickness  
(mm)



distance (km)

[2]

- (ii) Describe and explain the relationship between ash thickness and distance from the volcano.

.....

.....

.....

..... [2]

(iii) At what distance would you find ash that is 30 mm thick?

..... [1]

(iv) Name the hazard that occurs when ash mixes with water and flows downslope.

..... [1]

(b) (i) Name the type of volcano that is most likely to have produced both this ash and lava.

..... [1]

(ii) Draw a cross section diagram of the volcano to show the shape of the sides. Draw and label on the diagram the following features:

- a crater
- a feeder vent
- ash and lava.



[4]

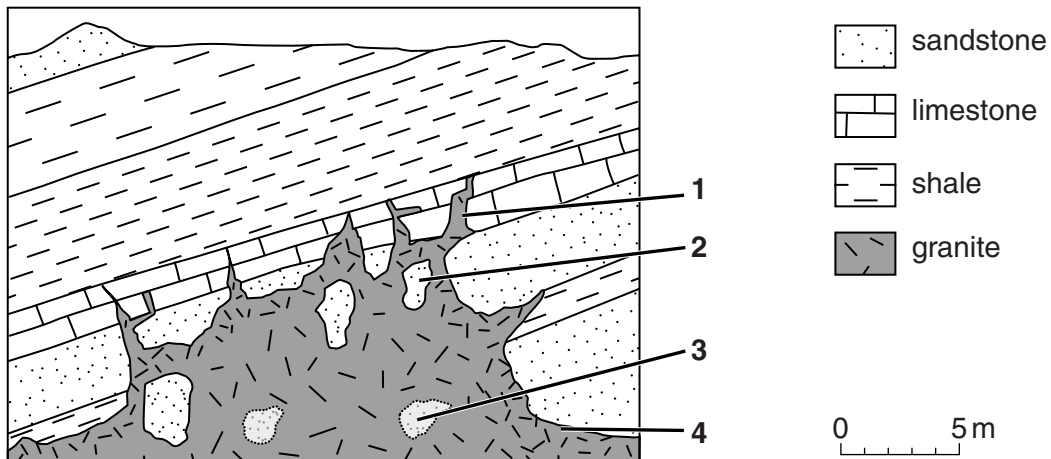
(c) Describe **two** methods of volcanic risk analysis.

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

[Total: 13]

Turn over

- 4 The diagram below shows a cross section through a small part of the top of a major granite igneous intrusion.



- (a) (i) Match the numbered features on the diagram to the terms given below.

	Terms
<b>F</b>	assimilation where xenoliths are partially melted into the magma
<b>G</b>	chilled margin
<b>H</b>	stopping where magma moves up along joints, faults and bedding planes and has separated masses of country rock
<b>J</b>	xenoliths

1 ..... 2 ..... 3 ..... 4 ..... [3]

- (ii) Within the metamorphic aureole there will be different contact metamorphic rocks formed depending on the parent rocks. In the table below state the metamorphic rocks that will be produced from each type of parent rock.

Parent rock	Metamorphic rock
<b>limestone</b>	
<b>sandstone</b>	
<b>shale</b>	

[3]

- (iii) Name **one** index mineral that only forms in rocks formed by contact metamorphism.

..... [1]



- (b) Describe with the help of a labelled diagram how silicic magma forms granite batholiths at a convergent oceanic-continental plate margin.



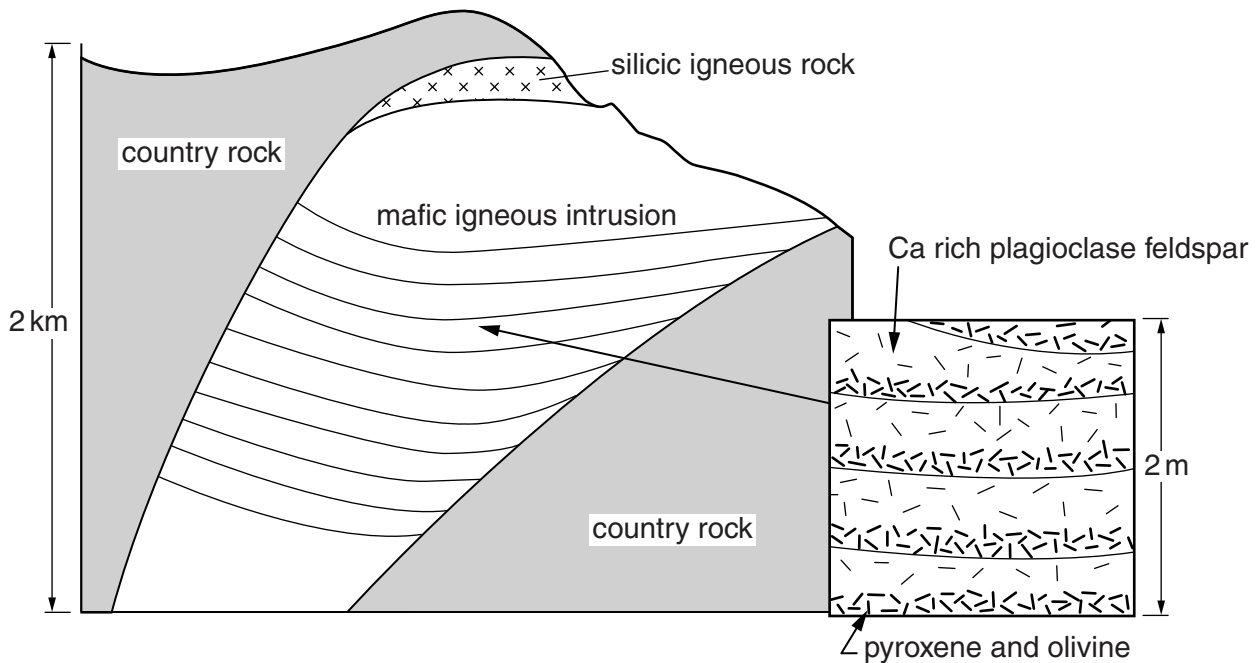
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..... [4]

- (c) The diagram below is a cross section through a major igneous intrusion which shows differentiation.



- (i) Shade on the diagram the area of the intrusion where the rock will be of the same composition as the original magma. [1]
- (ii) What term is used to describe the layered features shown on the inset diagram above? [1]
- ..... [1]
- (iii) Explain why these layers form in the intrusion. [2]
- .....
- .....
- .....
- ..... [2]
- (iv) Describe how the silicic igneous rock, shown on the diagram, was produced by the processes of differentiation from a mafic magma. [2]
- .....
- .....
- .....
- ..... [2]

[Total: 17]

- 5 (a) The rock cycle consists of a number of processes that operate at the Earth's surface. Match the definition of each process to the correct term.

	Definition
<b>K</b>	the breakdown of rocks in situ
<b>L</b>	the removal of weathered material
<b>M</b>	the means by which weathered material is moved
<b>N</b>	the laying down of sediment

	Term
<b>5</b>	deposition
<b>6</b>	erosion
<b>7</b>	transport
<b>8</b>	weathering

**K** .....

**L** .....

**M** .....

**N** .....

[3]

- (b) (i) Describe how boulder clay forms in a glacial environment.

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

- (ii) Describe how varves form in a glacial lake.

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

- (iii) What are fluvio-glacial sands and gravels?

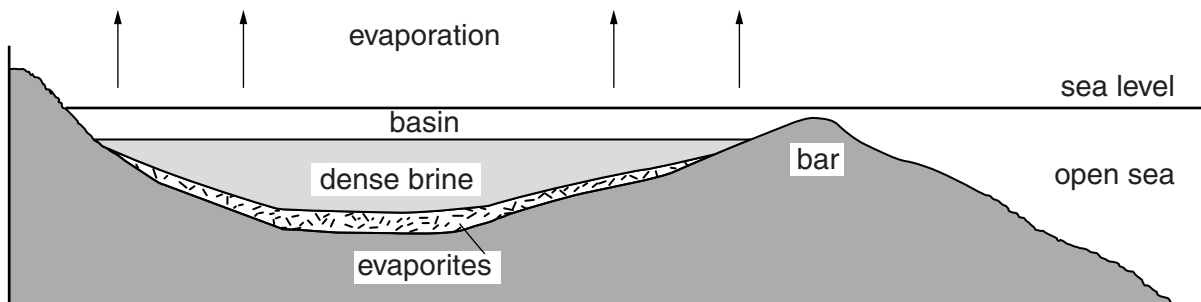
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 ..... [1]

- (c) Imbricate structure is sometimes seen in gravel deposits.  
Describe with the aid of a diagram how this forms.



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

- (d) The diagram below shows the deposition of evaporites in a barred basin.



- (i) Use the diagram to explain the processes that are occurring to form the evaporites.

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

- (ii) State the sequence of evaporite minerals that will be formed.

last to form.....

.....  
.....

first to form .....

[3]

- (e) (i) Salt pseudomorphs are sometimes found in evaporite deposits. Describe with the aid of labelled diagrams how they formed.



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

- (ii) Name another sedimentary structure found in the same environment as evaporite deposits.

..... [1]

[Total: 20]

6 Describe with the aid of labelled diagrams, the formation of the igneous textures:

**porphyritic, flow banding and amygdaloidal.**



*In your answer you should clearly link how these igneous textures form in specific igneous rocks.*

porphyritic

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flow banding

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.....

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amygdaloidal

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**[Total: 10]**

- 7 Describe the deposition of limestones in a non-clastic, shallow marine environment and explain how the limestones are produced by both chemical and biological processes.



*In your answer you should include at least one limestone formed by each process.*

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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.

The form consists of a large rectangular area with horizontal dotted lines for writing answers. A vertical solid line is positioned on the left side of the area, creating a narrow margin for the question number. The dotted lines are evenly spaced and extend across the width of the answer area.



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