



ADVANCED GCE
GEOLOGY
 Petrology

2835

Candidates answer on the Question Paper

OCR Supplied Materials:
 None

Other Materials Required:
 • Ruler (cm/mm)

Monday 21 June 2010
Morning

Duration: 1 hour 30 minutes



Candidate
Forename

Candidate
Surname

Centre Number

Candidate Number

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, however additional paper may be used if necessary.

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 **90**.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- Some questions in this paper are synoptic in nature. In your answers to these questions you are encouraged to show your knowledge and understanding of different areas of Geology and apply these and the geological skills you have learned, to the situations in the questions.
- This document consists of **16** pages. Any blank pages are indicated.

Examiner's Use Only:

1			
2			
3			
4			
5			
Total			



Answer **all** the questions.

- 1 The data below shows the mineral composition of a number of igneous rocks.

rock A		rock B		rock C	
mineral	%	mineral	%	mineral	%
augite (pyroxene)	45	quartz	25	augite (pyroxene)	20
plagioclase	55	potash feldspar	45	plagioclase	65
		plagioclase	17	hornblende	15
		biotite	13		

- (a) (i) Identify the igneous rock groups to which rocks **A**, **B** and **C** belong.

rock **A**

rock **B**

rock **C** [2]

- (ii) Rock **A** has an average crystal grain size of 0.5mm. The augite is found as euhedral crystals of 4 mm size in a finer mass of crystals. Fully name rock **A**.

..... [2]

- (iii) Explain how the texture in rock **A** formed.

.....

 [2]

- (b) Rock **B** has an average crystal grain size of 12mm and the minerals can be identified easily. Describe **one** physical property that can be used to identify each of the following minerals in a hand specimen of rock **B**.

quartz

.....

potash feldspar

..... [2]

- (c) State the differences in chemical composition that will be found between the plagioclase feldspars in rocks **A**, **B** and **C**.

A

B

C [2]

- (d) Rock **C** has a fine crystal grain size and shows amygdaloidal texture. The amygdales are composed of a white mineral with a hardness of 3, which has 3 cleavages allowing it to break into rhombic fragments.

- (i) Identify the mineral forming the amygdales.

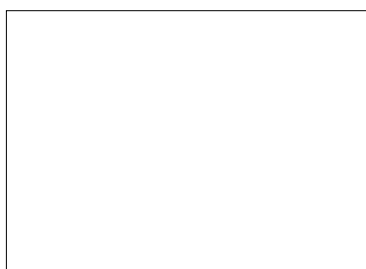
..... [1]

- (ii) Draw the mineral to show the 3 cleavages and rhombic shape.

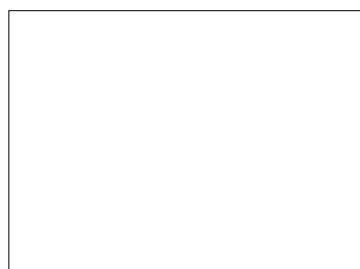
[2]

- (iii) With the help of labelled sketches describe the difference between the formation of amygdaloidal and vesicular textures.

amygdaloidal



vesicular



.....

.....

..... [3]

[Total: 16]

Turn over

2 Descriptions of three metamorphic rocks are given in the table below.

	description
rock D	<ul style="list-style-type: none"> • fine crystal size • grey, black, green or purple colour • splits into thin layers along cleavage planes
rock E	<ul style="list-style-type: none"> • white colour with green streaks • fine crystal size with a sugary texture • composed of calcite
rock F	<ul style="list-style-type: none"> • coarse crystal size • black and white colour in irregular layers • composed of quartz, potash feldspar and biotite

(a) (i) Identify the three metamorphic rocks.

D

E

F [3]

(ii) Explain how the green streaks in rock **E** formed.

.....

 [2]

(iii) Describe the likely conditions in which rock **F** formed.

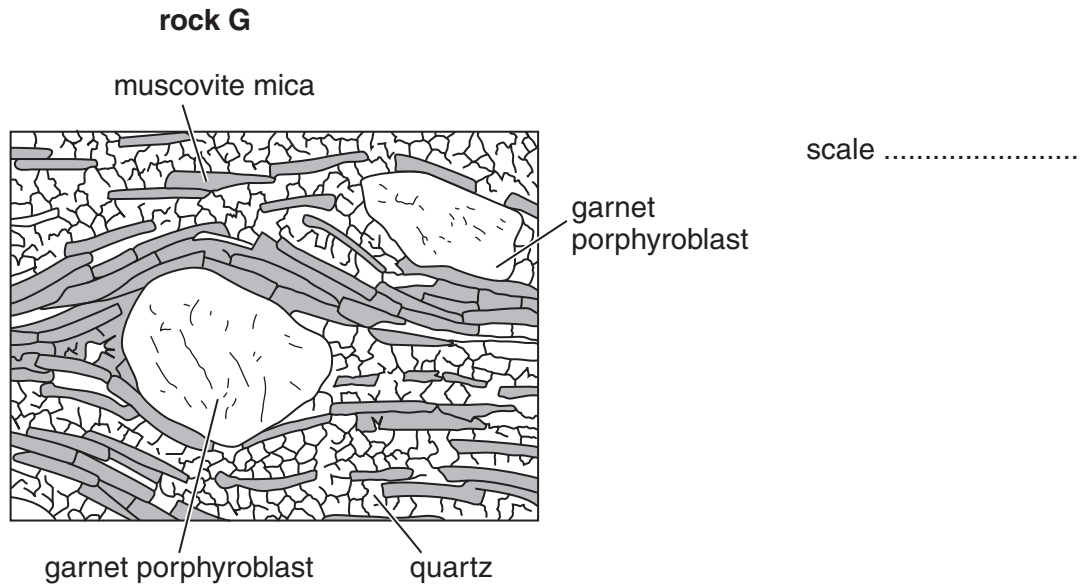
.....

 [2]

(b) Describe how you would identify garnet.

.....
 [1]

- (c) The thin section diagram below shows a metamorphic rock.



- (i) Add a suitable scale to the diagram so that the smaller garnet crystal size is 10mm maximum. [1]

- (ii) Identify the rock and name its texture.

rock G

texture

[2]

- (d) Match the correct terms in the list to the definitions in the table below.

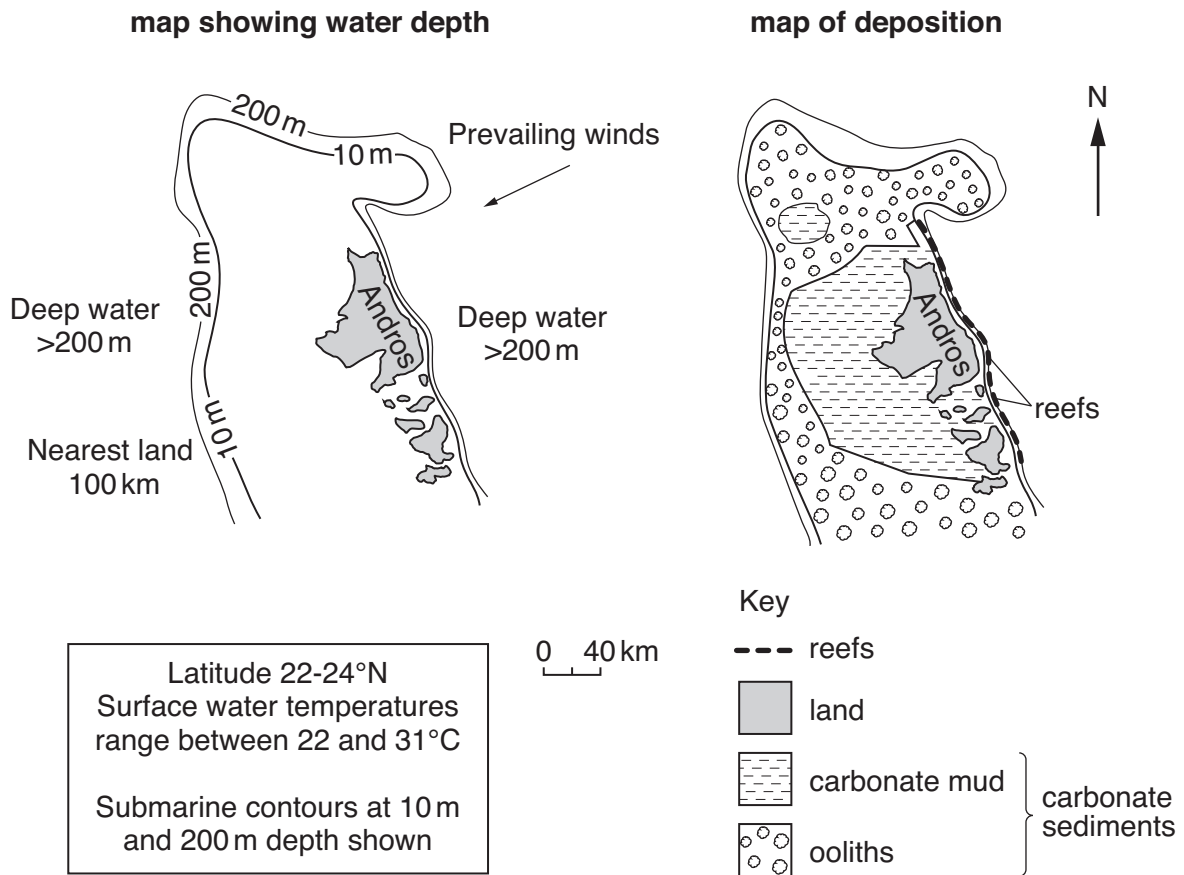
Barrovian zone cataclasis diagenesis foliation granoblastic

	definitions	terms
H	crushing of minerals in brittle rock	
J	layered structure formed by the segregation of different minerals in bands	
K	the processes that change a sediment into a rock	

[3]

[Total: 14]

- 3 The maps below provide general information and details of sedimentation for part of the Bahamas, an area of limestone deposition.



- (a) (i) Using the information provided, describe **two** conditions which are necessary for the accumulation of the carbonate sediments.

1.

.....

2.

..... [2]

- (ii) Explain why reefs are only found on the eastern side of the islands.

.....

..... [1]

- (iii) Explain the distribution of the ooliths shown on the map and describe how they form.

.....

.....

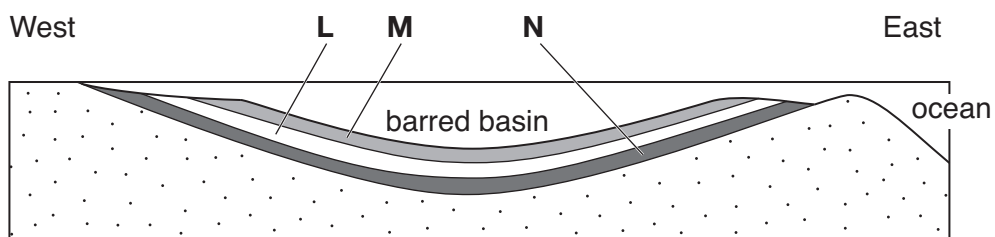
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..... [3]

- (b) The diagram below shows the minerals that are found in a barred marine basin.



- (i) What process produces this range of minerals?

..... [1]

- (ii) Identify and name the minerals that are low, medium and high solubility from the diagram above.

solubility	mineral name	mineral letter
high		
medium		
low		

[4]

- (c) Explain how the minerals **L**, **M** and **N** form in a barred marine basin.

.....

.....

.....

.....

.....

..... [3]

(d) With the help of diagrams, describe how salt pseudomorphs form.

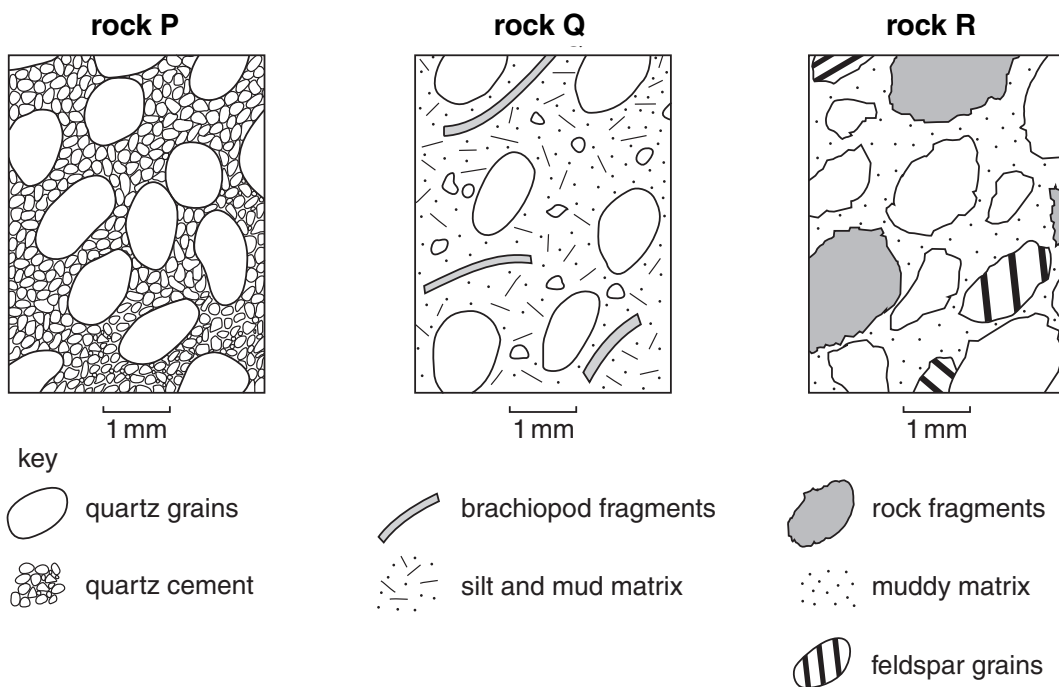
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.....

..... [3]

[Total: 17]

4 The diagram below shows three sandstones laid down in different environments.



(a) Complete the table of characteristics for each of the sandstones.

	grain shape	sorting
rock P		
rock Q		
rock R		

[3]

- (b) (i) State the likely environment of deposition for rock **P** and give **two** reasons for your answer.

.....

.....

.....

..... [2]

- (ii) State the likely environment of deposition for rock **Q** and give **two** reasons for your answer.

.....

.....

.....

..... [2]

- (iii) State the likely environment of deposition for rock **R** and give **two** reasons for your answer.

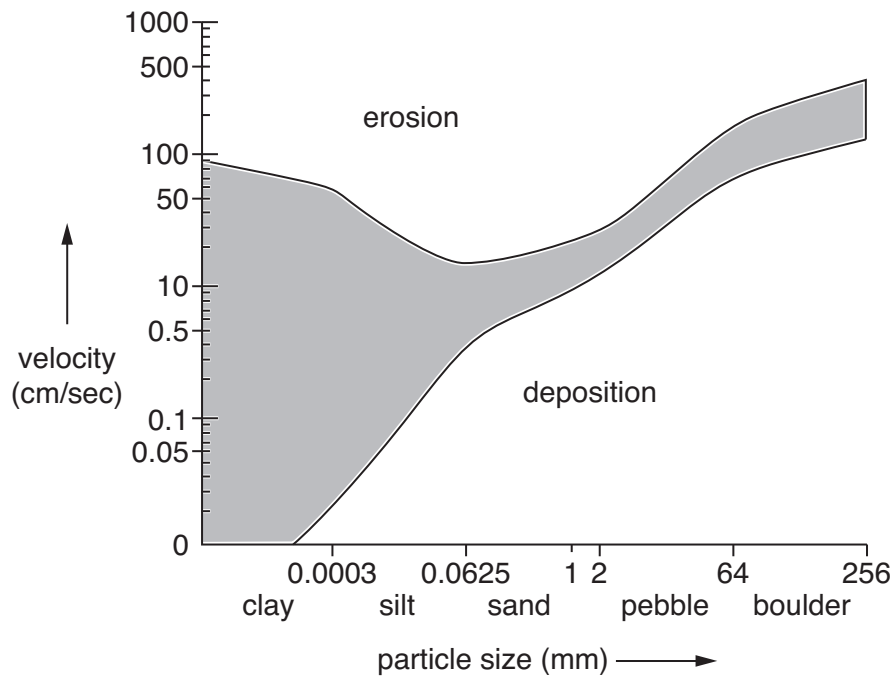
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.....

.....

..... [2]

(c) The graph below shows the current velocity needed to transport sediment particles.



- (i) What are the maximum and minimum velocities at which the sand grains in rock **Q** were transported?

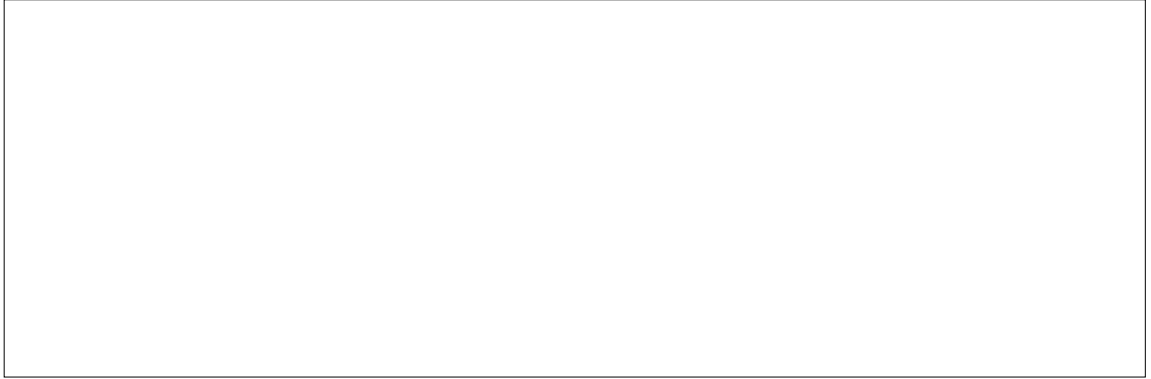
maximum minimum [2]

- (ii) At what velocity was the silt and mud matrix of rock **Q** likely to be deposited?

..... [1]

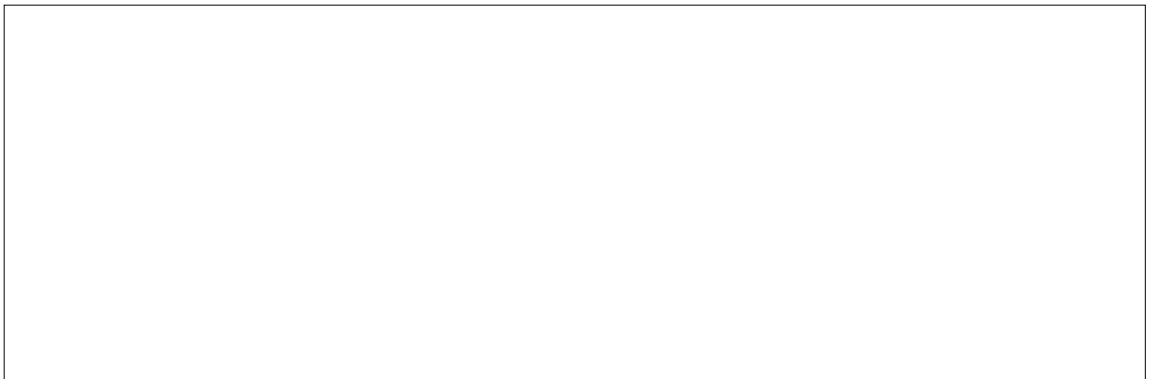
- (d) Lithostratigraphic correlation is used to match sequences of rocks several kilometres apart. However there are problems that make this method inaccurate and difficult to apply in some areas. Explain with the help of diagrams each of the problems given below:

- (i) diachronous beds



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

- (ii) lateral change (lithological variation).



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

[Total: 18]

5 In this question, two marks are available for the quality of written communication.

Answer **both** parts of the question.

- (a)** Describe the processes of differentiation by which a variety of rock types can be produced from a single parent magma.

[illegible]

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[Total: 25]

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