

Thursday 19 January 2012 – Morning

AS GCE GEOLOGY

F792 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

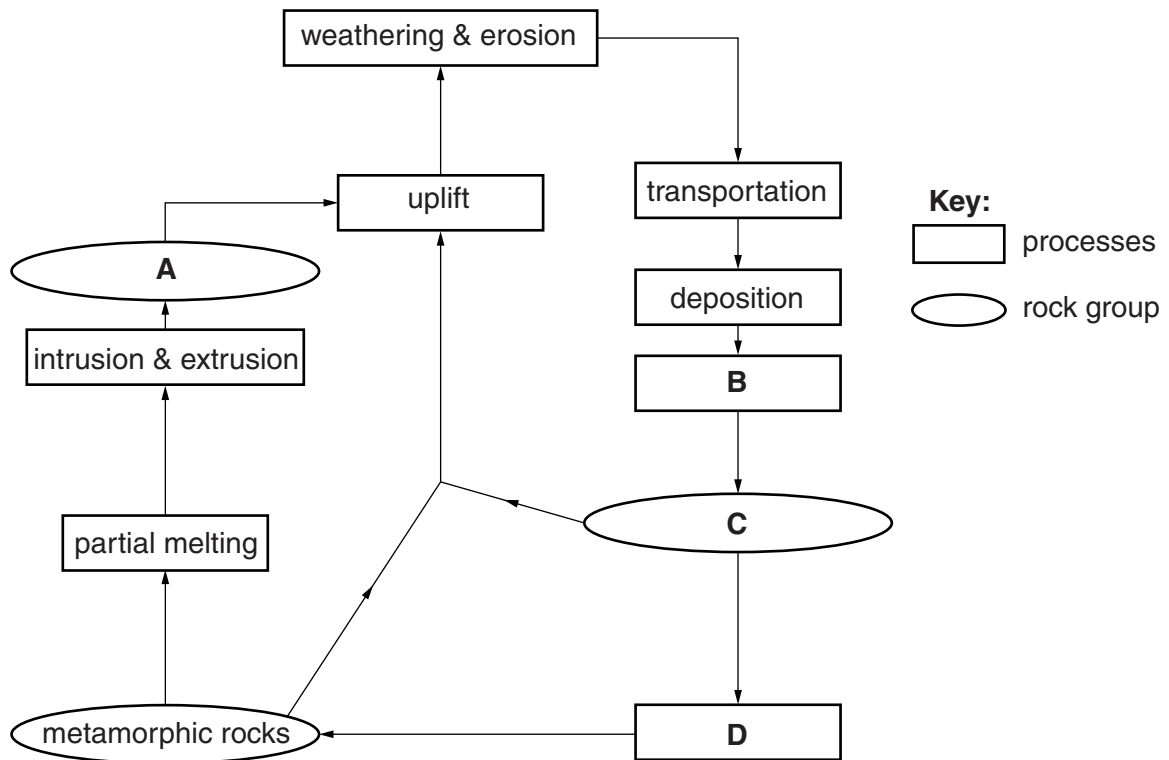
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting 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.
- 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 The diagram below shows processes and products that are part of the rock cycle.



(a) (i) Identify the processes and rock groups **A**, **B**, **C** and **D** on the rock cycle diagram.

A **B**
C **D** [4]

(ii) Describe the process of uplift.

.....
 [1]

(iii) Define the processes of *weathering* and *erosion*.

weathering

 erosion
 [2]

(b) (i) Name and describe **two** methods of transporting sediment by a river.

1

.....

2

..... [2]

(ii) Describe how abrasion and attrition affect quartz grains that are transported down a river.

abrasion

.....

attrition

..... [2]

(c) Minerals can be useful for distinguishing between igneous, sedimentary and metamorphic rocks. Below is a list of some rock-forming minerals.

- mica
- garnet
- feldspar
- calcite
- olivine
- clay minerals

Complete the table below by selecting **one** mineral for each rock group that is found in that rock group **only**.

rock group	mineral
igneous	
sedimentary	
metamorphic	

[3]

(d) Give **two** reasons why the mineral quartz is common in all three groups of rock.

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.....

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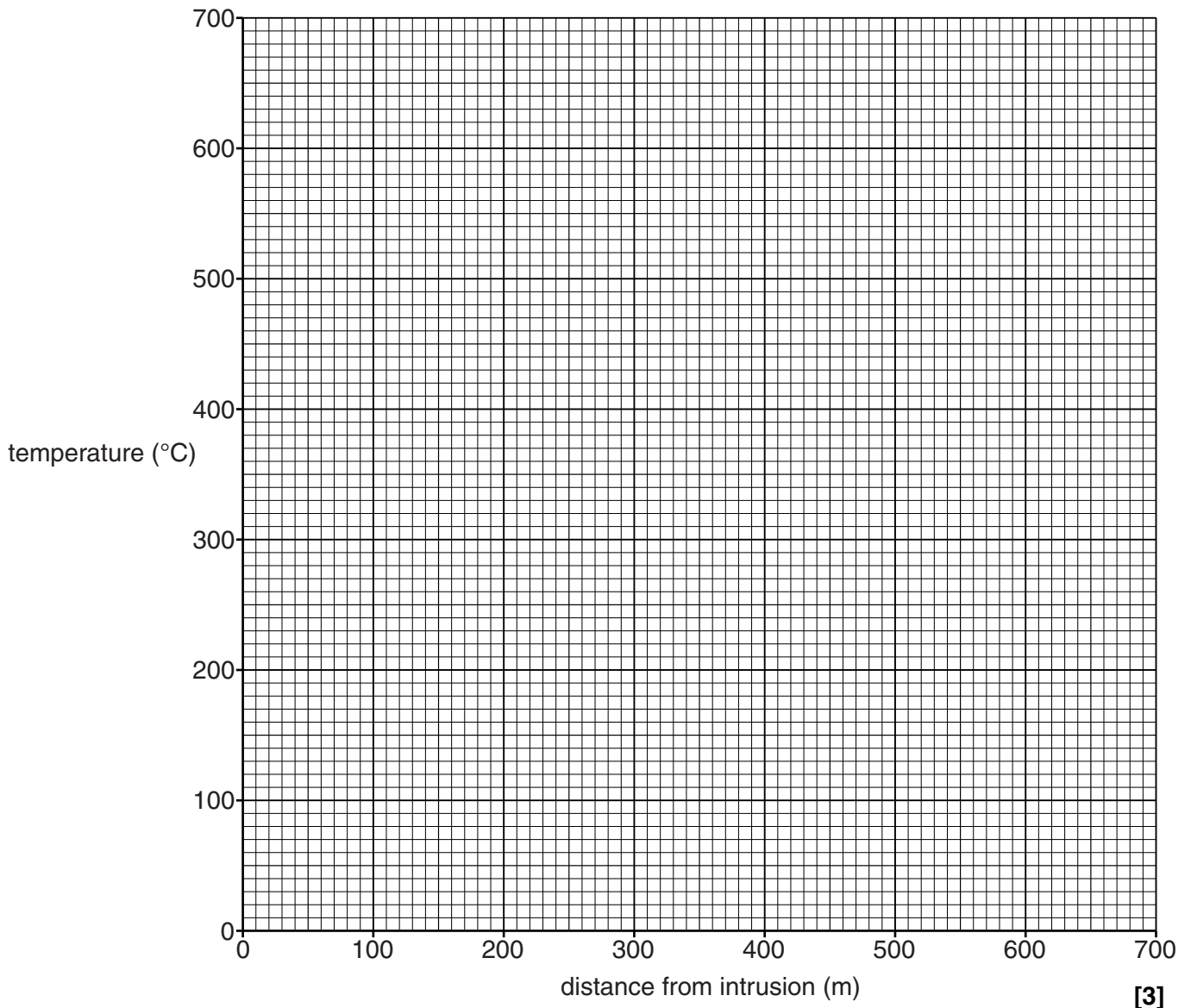
..... [2]

[Total: 16]

- 2 The temperature has been measured in the sandstone country rock around two igneous intrusions of the same composition but of different size. The results are shown in the table below.

distance from intrusion (m)	temperature ($^{\circ}\text{C}$) of rocks	
	intrusion E	intrusion F
0	650	650
100	420	520
200	250	390
300	150	280
400	100	190
500	100	120
600	100	100

- (a) (i) On the graph below, plot line graphs to show how temperature changes with distance from intrusions **E** and **F**.



(ii) Metamorphism takes place at temperatures in excess of 200 °C. Use your graph to state the width of the metamorphic aureole for each intrusion.

Em Fm [2]

(iii) Use your graph to identify the larger intrusion. Explain why the temperature change in the country rock varies with the size of the intrusion.

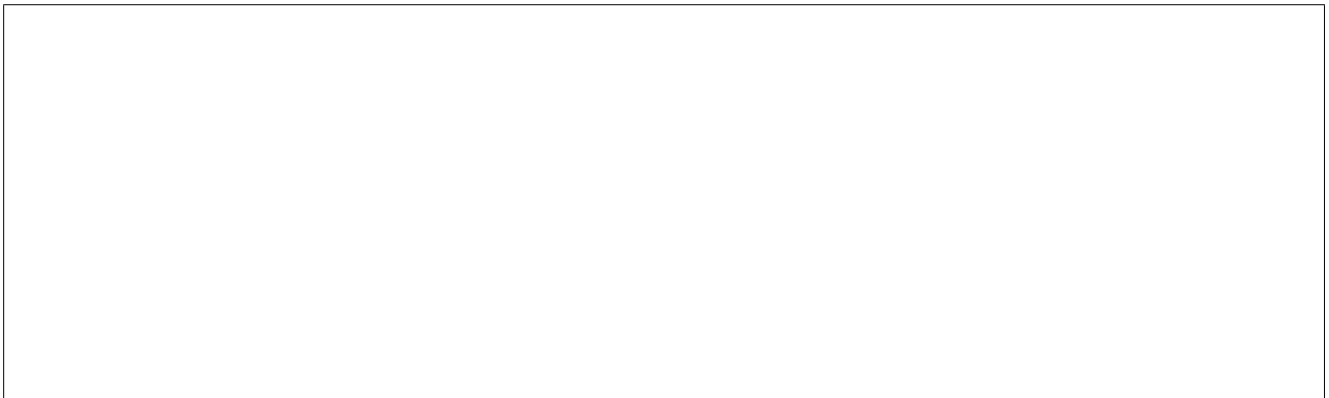
larger intrusion

explanation

.....

..... [2]

(b) (i) Draw a labelled cross-section diagram to show the relationship between an intrusion, the country rock and the metamorphic aureole.



[3]

(ii) The country rock is sandstone. Name the rock type inside the metamorphic aureole.

..... [1]

(c) Describe the difference between vesicular and amygdaloidal texture.

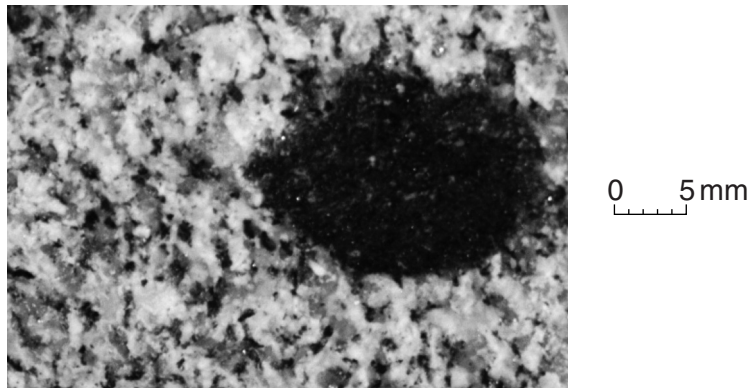
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..... [2]

(d) The photograph shows a feature within the igneous rock forming an intrusion.



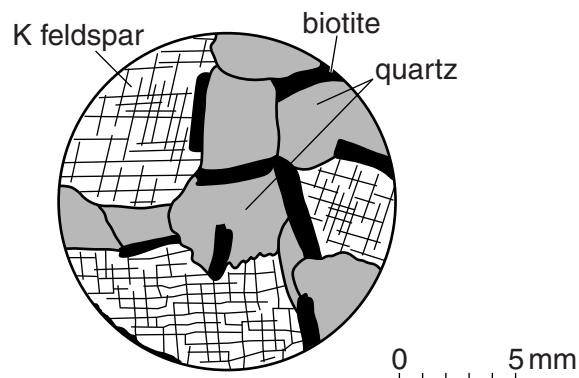
Identify the feature and explain how it formed.

identification

explanation

..... [2]

(e) The thin section drawing below is from a rock that forms an intrusion.



(i) Identify the rock and the texture shown in the thin section drawing.

rock texture [2]

(ii) Explain how the texture shown above formed.

.....

 [2]

[Total: 19]

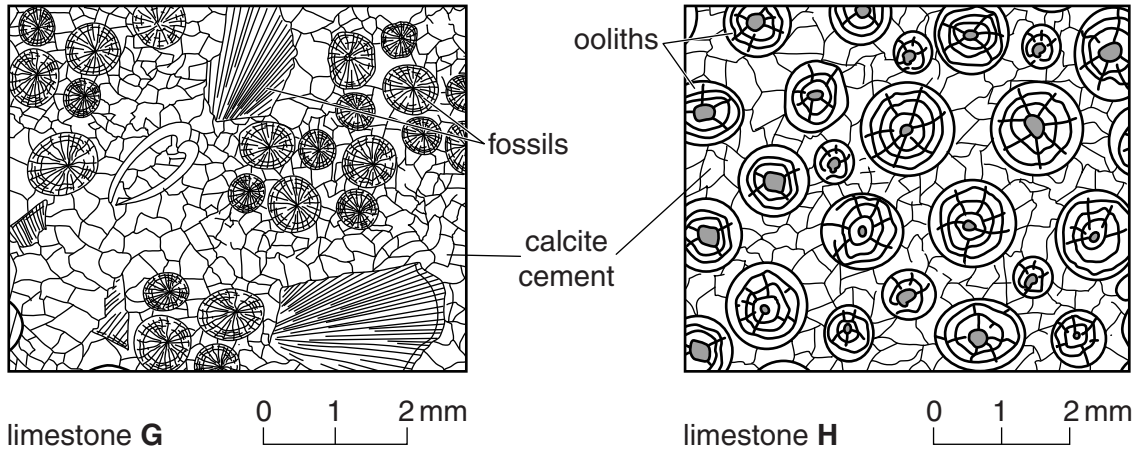
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3 The diagrams below are drawn from cut and polished surfaces of two Carboniferous limestones that were found in beds in the same quarry.



(a) (i) State **two** essential conditions necessary for the deposition of these limestones.

- 1
- 2 [1]

(ii) Identify both limestones.

- G**
- H** [2]

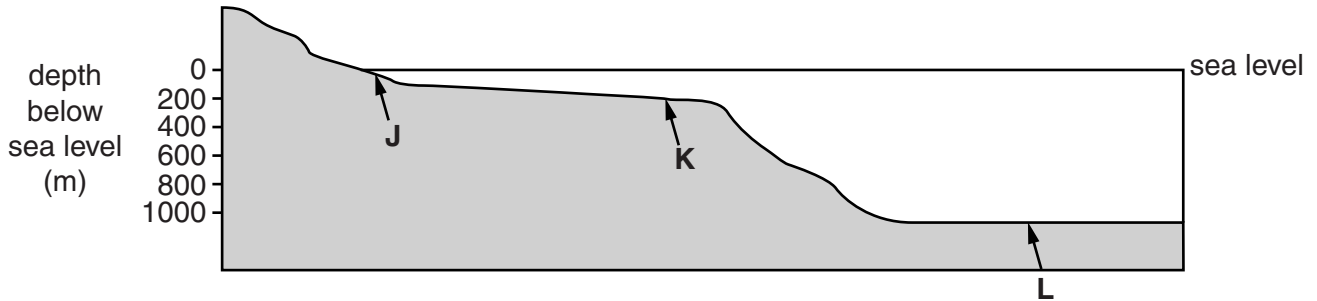
(iii) Explain how limestone **H** formed. You may use labelled diagram(s) to aid your explanation.

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-
- [2]

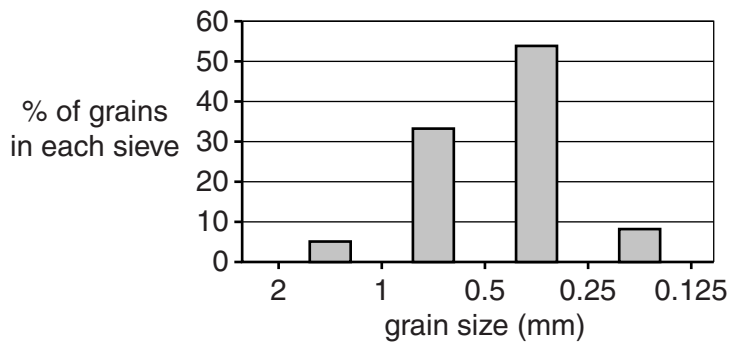
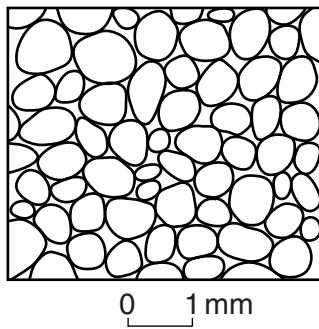
(b) (i) Study the coastal cross section below and label the following areas:

- **abyssal plain (ocean basin)**
- **continental shelf**
- **continental slope.**

[2]



(ii) The thin section drawing and the bar chart show sediment found at J. Using technical terms, describe the grain size, sorting and grain shape of this sediment.



grain size

grain sorting

grain shape [2]

(iii) Suggest the clastic rock most likely to form at K.

..... [1]

(iv) At L deep sea oozes have formed. Describe how they form.

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..... [2]

(c) Turbidites can be recognised in the geological record if **graded bedding** and **flute casts** both occur in the same bed.

(i) Describe and explain the formation of a graded bed. Use a labelled diagram to aid your explanation.



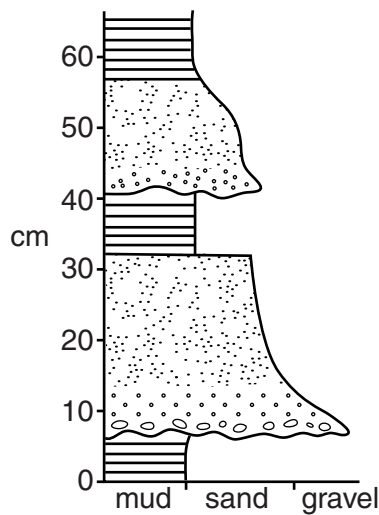
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 [2]

(ii) Clearly label the graphic log below to show:

- **greywacke**
- **shale**
- **where flute casts could be found.**

[2]



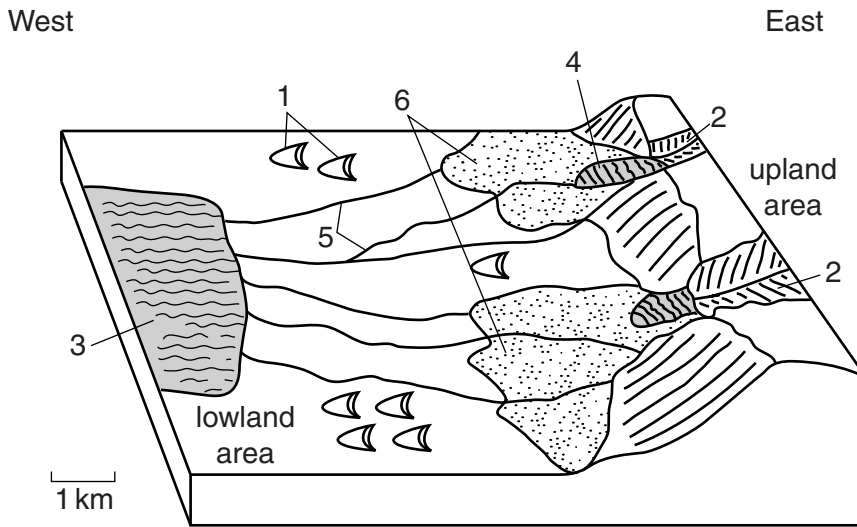
(iii) How many turbidity flows are shown on this graphic log? Explain your answer.

Number of flows

.....
 [1]

[Total: 17]

4 The drawing below shows a modern desert area.



(a) (i) Complete the table by writing the correct number 1 to 6 chosen from the drawing.

desert feature	number from diagram
alluvial fan	
barchan sand dune	
debris flow	
playa lake	
wadi channel	

[4]

(ii) Draw an arrow on the diagram to show the prevailing wind direction.

[1]

(b) Describe and illustrate **three** characteristics of the conglomerate that is likely to be found in a wadi.

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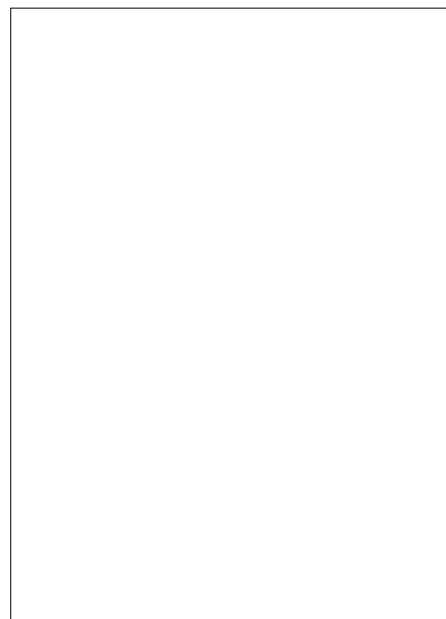
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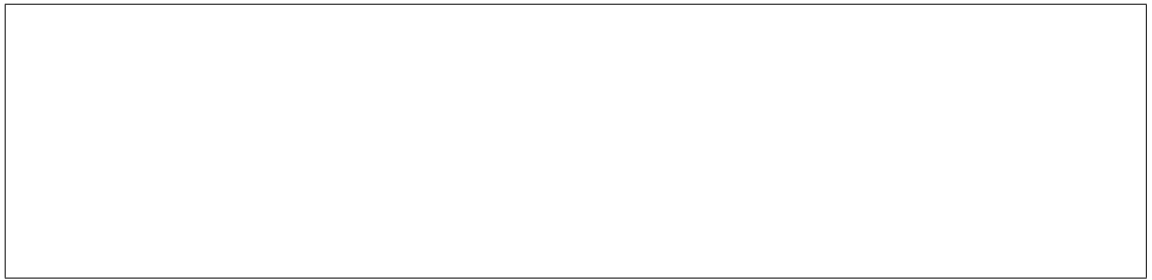
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[3]

- (c) (i) Draw a cross section through a sand dune indicating as accurately as possible the dip of the internal stratification of the dune. Label the leeward and windward sides.

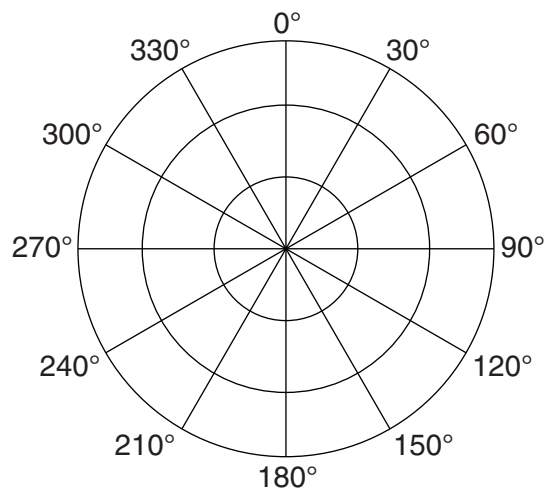


[3]

- (ii) The data in the table below show measurements of the orientation of the dip of cross bedding from an ancient desert deposit.

orientation	number of measurements	orientation	number of measurements
1° – 30°	0	181° – 210°	15
31° – 60°	0	211° – 240°	29
61° – 90°	0	241° – 270°	10
91° – 120°	0	271° – 300°	0
121° – 150°	5	301° – 330°	0
151° – 180°	8	331° – 360°	0

Use the data in the table to complete the rose diagram below.



Use the rose diagram to interpret the wind direction when the ancient dune was formed.

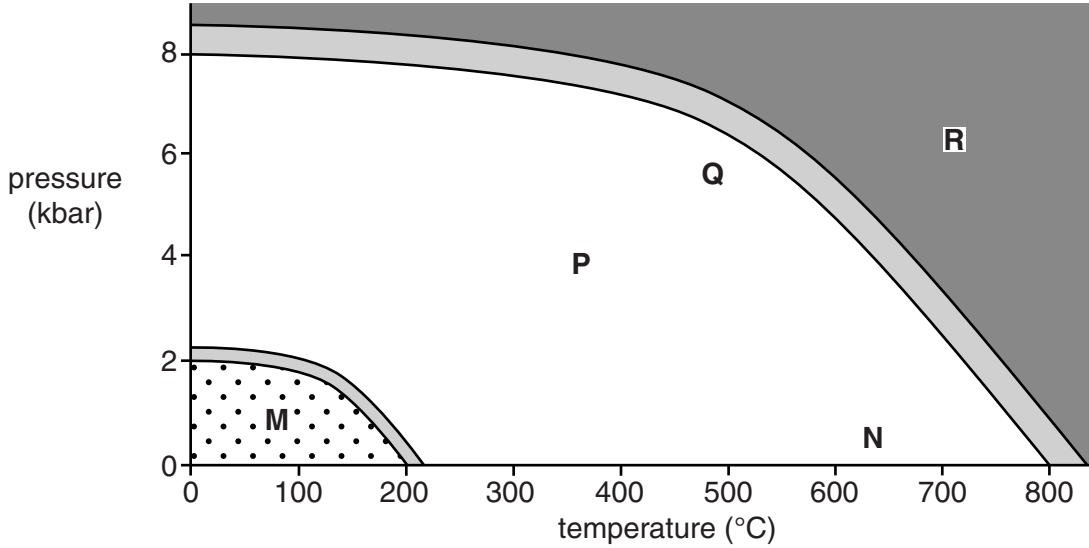
From to

[2]

[Total: 13]

5 The pressure–temperature graph below shows the conditions under which rocks form.

- (a) (i) Metamorphic rocks are divided into three groups based on their origin. Mark on the diagram dividing lines and label each of the **three** types of metamorphism. [2]
- (ii) Match the letters on the graph to the rocks listed in the table below.



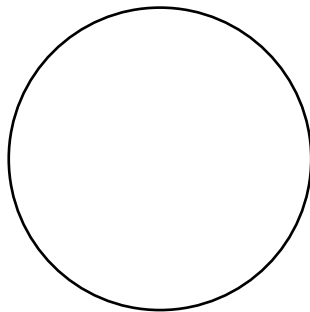
rock	letter on graph
gneiss	
granite	
hornfels	
schist	
shale	

[4]

- (iii) Describe how pressure and temperature are related to depth below the surface.

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 [1]

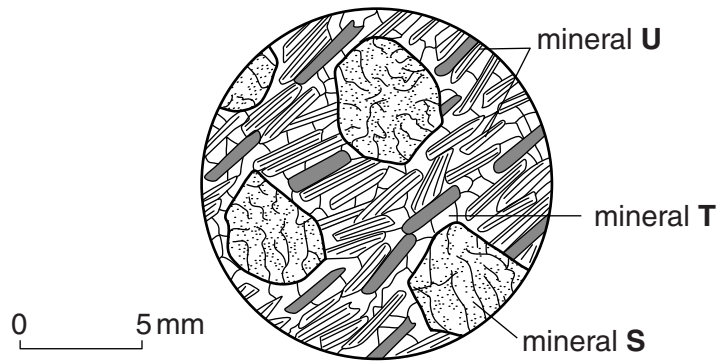
- (b) Draw a fully labelled thin section diagram to show marble.



[2]

Turn over

(c) Below is a thin section drawing of a metamorphic rock.



(i) Identify the metamorphic rock and the texture shown in the thin section drawing.

rock texture [2]

(ii) Identify the minerals **S**, **T** and **U** in the thin section above using the information in the table below.

name	cleavage	common form	colour
biotite mica	one perfect, splits into thin elastic sheets	long thin flaky mineral	dark brown to black
muscovite mica	one perfect, splits into thin elastic sheets	long thin flaky mineral	light coloured, silvery
garnet	none	large rounded crystals of cubic system	red
quartz	none	medium sized interlocking crystals	glassy grey or white

S **T**

U [2]

(d) Describe how gneissose banding forms.

.....

 [2]

[Total: 15]

6 Describe and explain deposition in deltaic environments. Use the following as headings:

- delta top (topsets)
- delta slope (foresets)
- offshore deposition (bottomsets).

Draw diagram(s) to help explain your answer.



In your answer you should make clear the links between the environments and the rocks deposited.

delta top (topsets)

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delta slope (foresets)

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offshore deposition (bottomsets)

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..... [10]

[Total: 10]

- 7 Describe how crystal grain size, mineral composition and silica percentage are used to classify igneous rocks.



In your answer you should make sure that the names of the minerals and rocks are spelled correctly.

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ADDITIONAL PAGE

If additional space is required, you should use the lined pages below. The question number(s) must be shown clearly.

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ADDITIONAL PAGE

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