OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Advanced Subsidiary GCE

GEOLOGY

F792 QP

Unit F792: The Rocks – Processes and Products

Specimen Paper

Candidates answer on the question paper.
Additional Materials:

Scientific calculator
Ruler (cm / mm)

Time: 1 hour 45 mins

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED.

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 marks for the quality of written communication in your answer.
- You may use a scientific calculator.
- You are advised to show all the steps in any calculations.
- The total number of marks for this paper is **100**.

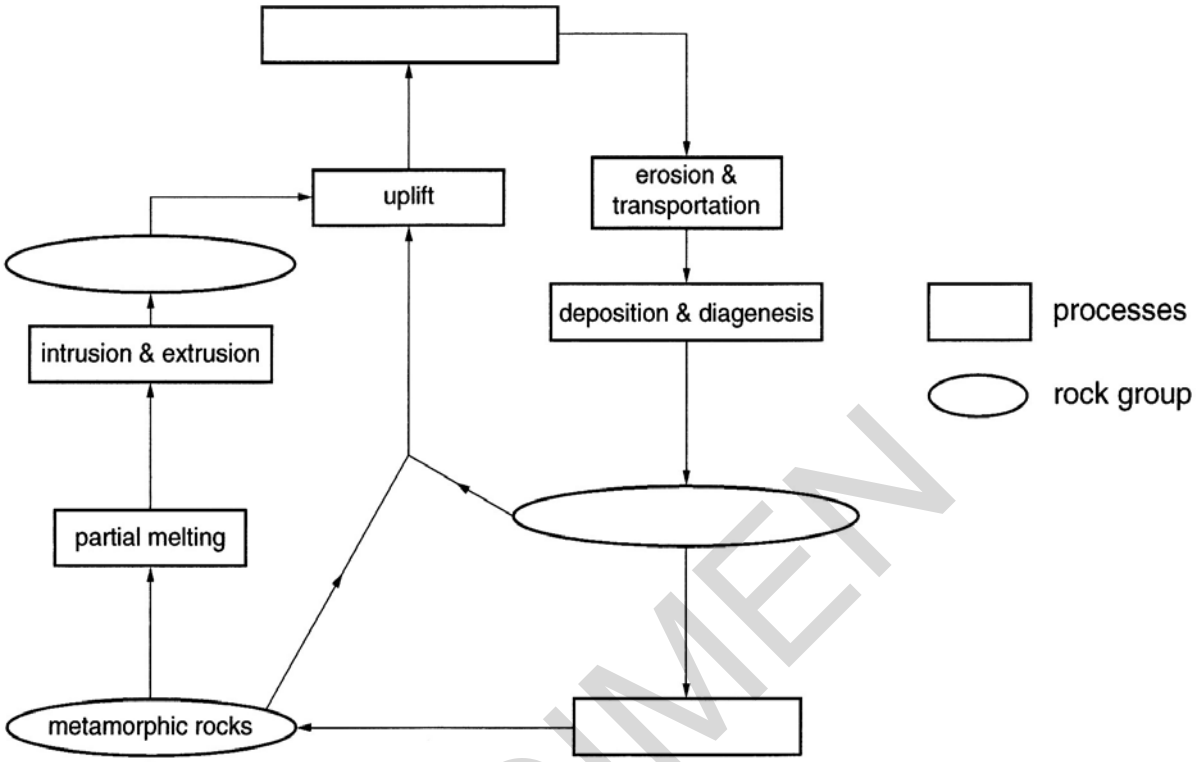
FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**17**	
2	**16**	
3	**15**	
4	**16**	
5	**16**	
6	**10**	
7	**10**	
TOTAL	**100**	

This document consists of **15** printed pages and **1** blank page.

Answer **all** the questions.

1 **(a)** The rock cycle consists of a series of processes and products.

(i) Complete the diagram below.



[4]

(ii) Define the following terms:

intrusion .....

.....

.....

metamorphism .....

.....

.....

partial melting .....

.....

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

(a) Samples of five different rock types were collected and their characteristic features recorded in the table below.

	samples				
features	A	B	C	D	E
crystalline		✓		✓	✓
fossils present			✓		
fragmental texture	✓				
foliated texture				✓	
porphyritic texture					✓
shows bedding	✓		✓		
sugary texture		✓			

(i) Which **two** samples are sedimentary rocks?

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

(ii) Give reasons to explain your choice.

.....

.....

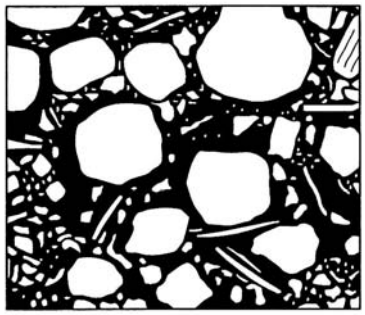
.....

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

(iii) Which **two** samples are metamorphic rocks?

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

(iv) Using technical terms, describe the sedimentary rock below.



[4]

grain shape .....

grain size .....

sorting .....

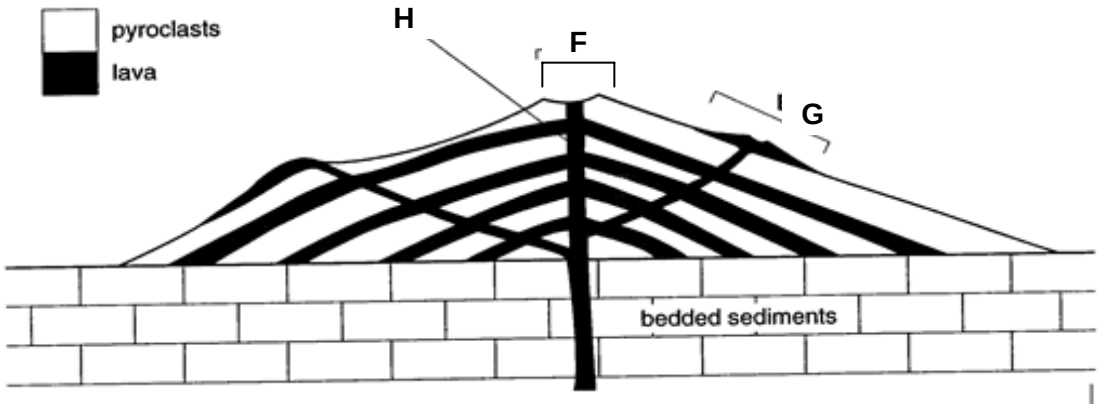
overall texture .....

[4]

[Total: 17]

[Turn over

2 The diagram shows a cross section through a strato volcano.



(a) **(i)** Identify the igneous features shown.

F… .....

G .....

H ..... **[3]**

(ii) Compare the eruption of the two types of product shown.

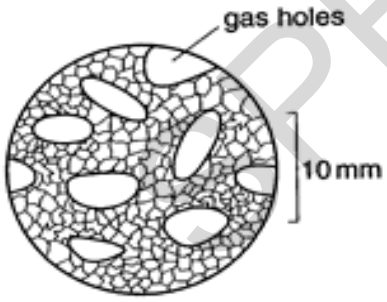
.....

.....

.....

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

(b) Describe the crystal grain size and the texture of this thin section diagram.



crystal grain size .....

.....

texture .....

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

(c) Describe **one** possible advantage of living close to a volcano.

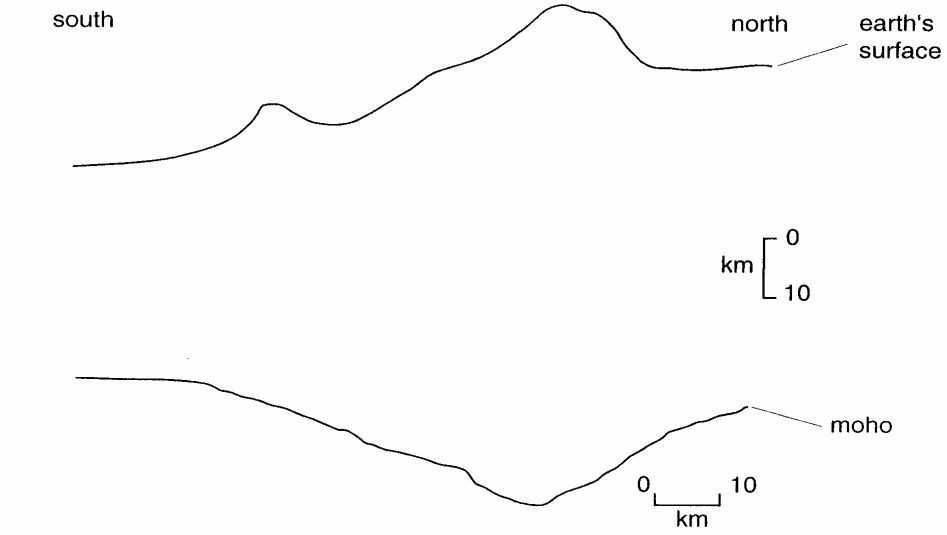
.....

.....

.....

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

(d) The diagram shows a simplified cross section through the Himalayan orogenic belt.



(i) Add arrows to the diagram to show the direction of plate movement. **[1]**

(ii) Measure the maximum thickness of the crust on the diagram.

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

(iii) Shade an area on the diagram where crust may be partially melting. **[1]**

(iv) Explain why partial melting is taking place in the area that you have shaded.

.....

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

(v) Discuss the reasons why the magma produced by the partial melting does not reach the surface to form volcanoes.

.....

.....

.....

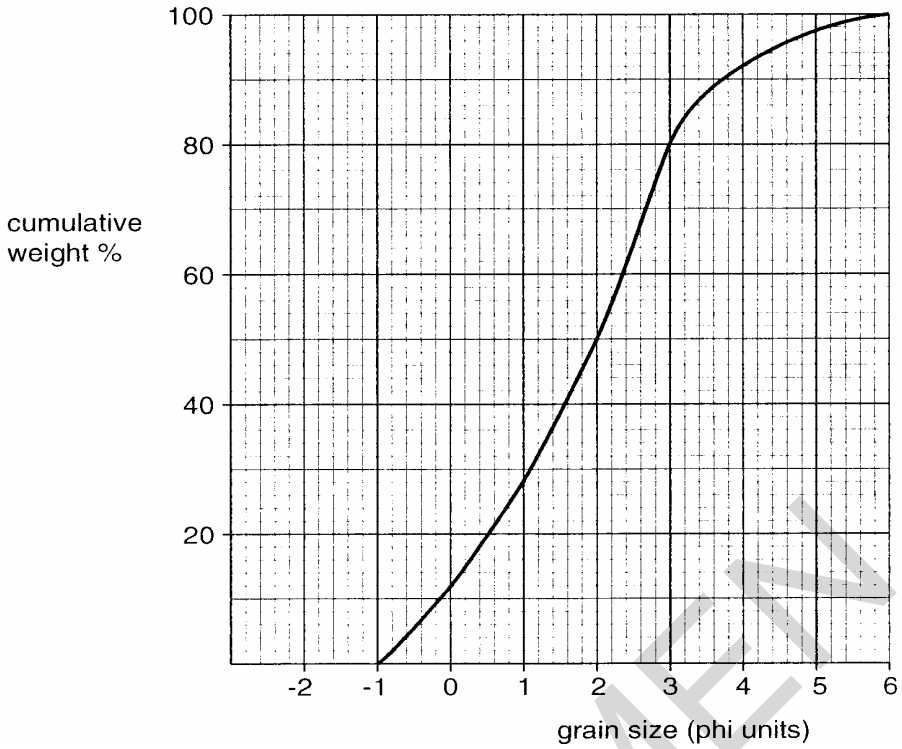
..... **[2]**

(vi) Name a typical igneous rock that forms under such conditions within the crust.

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

[Total: 16]

3 The graph below shows a cumulative frequency curve for an unknown sediment.



(a) (i) Define the term *sorting.*

.....

.....

.....

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

(ii) Using the cumulative frequency graph and the information below, calculate the coefficient of sorting.

$$\text{Coefficient of sorting} = \frac{Ø84 - Ø16}{2}$$

(Where Ø84 is the grain size of the cumulative weight of 84% of the sample and Ø16 is the grain size of the cumulative weight of 16% of the sample.)

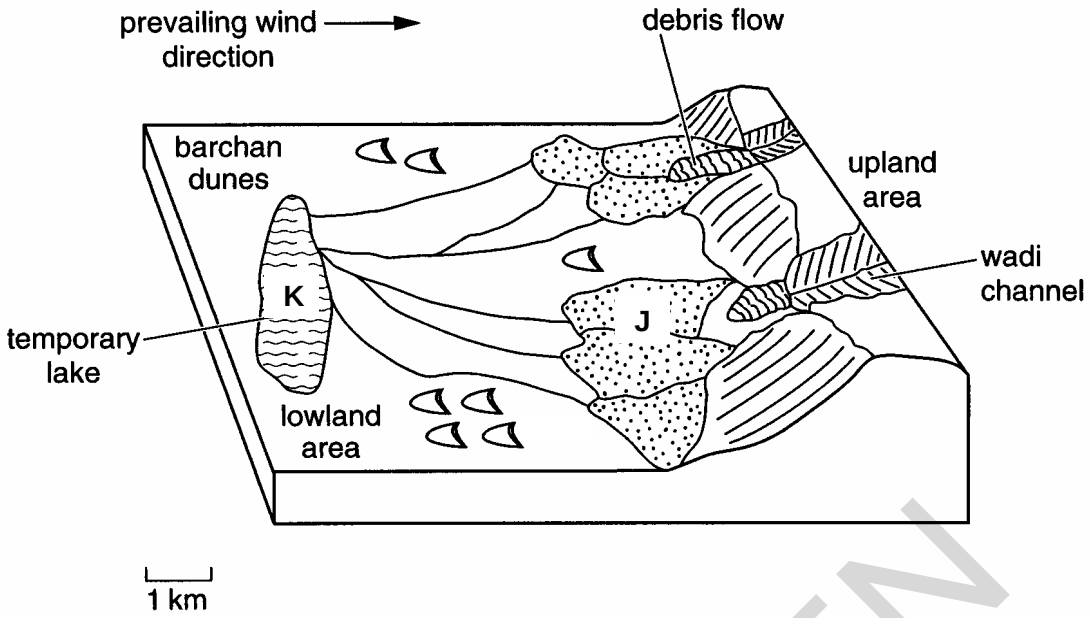
coefficient of sorting =..... **[2]**

(iii) What degree of sorting is shown by this sediment?

coefficient of sorting	<0.50	well sorted
	0.5-1.00	moderately sorted
	>1.00	poorly sorted

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

The diagram below shows the geography of an area that has a hot, dry climate. Heavy rain sometimes falls in the mountains but no rivers reach the sea.



(b) **(i)** What type of clastic sediment would probably be deposited at points **J** and **K**?

J.....

K..... **[2]**

(ii) Explain why there is a variation in the type of sediment deposited.

.....

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

(c) **(i)** Describe the characteristics of sediment **J** in terms of both textural and compositional maturity.

.....

.....

.....

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

(ii) Name a possible rock that may form from sediment **J**.

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

(iii) What name is given to the environment of deposition of sediment **J**?

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

(d) The lake found in the lowland area is temporary.

(i) What name is given to this type of temporary lake?

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

(ii) The sedimentary rocks formed in location **K** often contain salt pseudomorphs. Explain how these form.

.....

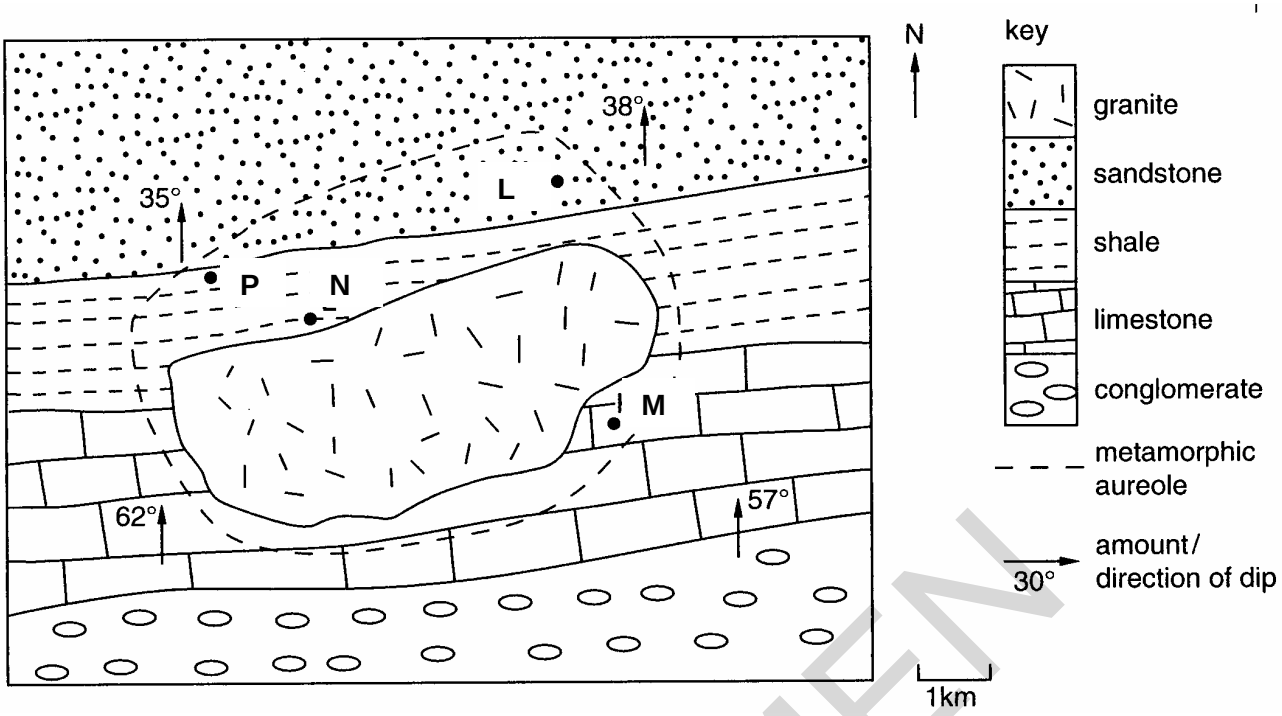
.....

.....

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

[Total: 15]

4 The map below shows an igneous intrusion and its surrounding country rocks.



(a) (i) Define the term *metamorphic aureole*.

.....

.....

.....

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

(ii) Suggest **two** reasons why the width of the metamorphic aureole is greater in the north than in the south.

.....

.....

.....

.....

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

(iii) Name the metamorphic rocks that would be found at

L .....

M .....

N .....

P ..... **[4]**

[Turn over

(iv) Explain why all these metamorphic rocks are unfoliated.

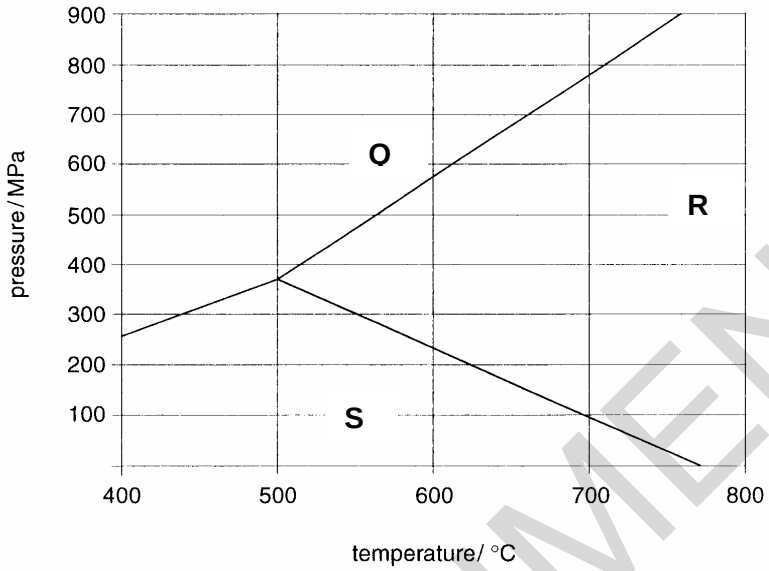
.....

.....

.....

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

(b) The graph below shows the Al_2SiO_5 polymorph phase diagram.



(i) Complete the Al_2SiO_5 polymorph phase diagram above by adding the relevant mineral names.

Q .....

R .....

S ..... **[2]**

(ii) Which of the three polymorphs is most likely to occur in medium grade thermal metamorphic rocks?

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

(iii) State the pressure and temperature conditions at which all three polymorphs can co-exist.

pressure .....

temperature ..... **[1]**

(iv) Describe the sequence of index minerals that is found when clay undergoes regional metamorphism.

.....

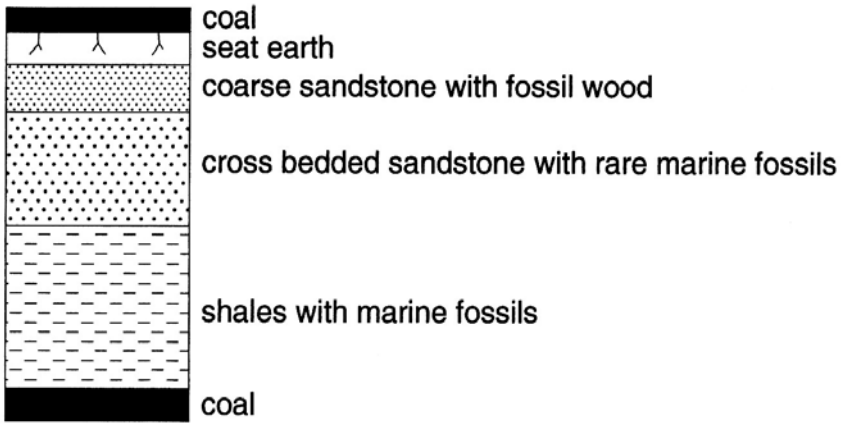
.....

.....

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

[Total: 16]

5 The vertical sequence below, shows rocks deposited in a delta.



(a) (i) Define the term *delta.*

.....

.....

.....

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

(ii) On the vertical sequence above, clearly label the beds deposited in the following environments:

delta slope foreset

offshore deposition (bottomset)

delta top (topset).

[3]

(iii) Draw a cross section diagram of a delta to show the areas where the delta top, offshore deposits and delta slope beds are deposited.

[3]

(b) Describe the ideal environmental conditions for the formation of coal.

.....

.....

.....

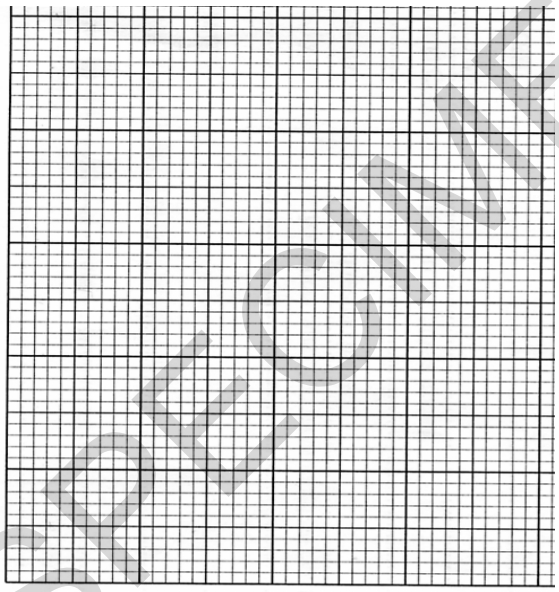
.....

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

(c) Study the table below, which gives the average composition of different types of coal.

	peat	lignite	bituminous	anthracite
carbon	52%	66%	83%	93%
volatiles	37%	26%	15%	6%
sediment	11%	8%	2%	1%

(i) Draw a bar chart to show the percentage carbon content of each type of coal.



[2]

(ii) Name the process that changes peat into anthracite.

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

(iii) Use data from the table and your bar chart to describe the changes that take place.

.....

.....

.....

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

[Total: 16]

6 Describe how igneous rocks are classified. Use the terms silica percentage, crystal grain size and mineralogy in your answer.

In your answer you should make clear how the methods that you are using to classify link together.

[Total: 10]

[Turn over

7 Describe the formation of limestones in clear, non-clastic shallow marine environments. You may use diagrams to illustrate your answer.

In your answer you should make clear how the limestones link to different environments.

....

.... **[Total: 10]**

Paper Total [100]

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OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

GEOLOGY F792 MS

Unit F792: The Rocks - Processes and Products

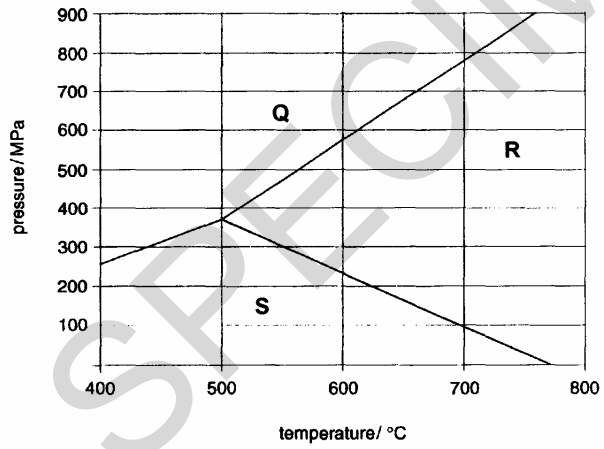
Specimen Mark Scheme

The maximum mark for this paper is **100**.

This document consists of **9** printed pages and **3** blank pages.

Question Number	Answer	Max Mark
1(a)(i)	Reading down from the top of the diagram: weathering igneous / igneous rocks sedimentary /sedimentary rocks metamorphism	[1] [1] [1] [1]
(ii)	Intrusion = a body of igneous rock that has forced itself / is emplaced into (pre) existing / country rocks Metamorphism = changing the characteristics of a rock in the solid state due to temperature and / or pressure (and volatiles) Partial melting = incomplete melting of rock / crystals / grains within a rock begin to melt around the edges	[1] [1] [1]
(b)(i)	A C	[1] [1]
(ii)	both show bedding C contains fossils A has fragmental texture ora	[2]
(iii)	shape - angular/ sub angular / sub rounded size - conglomerate / breccia / rudaceous / coarse / grave l/ measured range sorting - very poor / poorly texture - fragmental / made of grains / particles / immature / clastic	[1] [1] [1] [1]
(iv)	B D	[1] [1]
2(a)(i)	F = crater /caldera G = parasitic cone / secondary cone / secondary crater H = vent / dyke / feeder pipe / conduit	[1] [1] [1]
(ii)	pyroclastic material = explosive / violent activity / more gas in magma lava = magma rise up vent / non explosive phase / lava with less gas / lava flowing out of vent / effusive	[1] [1]
(b)	fine crystal grain size /as a measurement in mm must be <2mm vesicular texture	[1] [1]
(c)	geothermal power / energy sources / hot springs as a source of heating for water / central heating /tourist potential / fertile soils details of above	[1] [1]
(d)(i)	compressive in from sides, two correct	[1]
(ii)	85km +/- 5km	[1]
(iii)	in root zone below marked area	[1]

Question Number	Answer	Max Mark
(iv)	increased temperature (with depth) presence of water	**[1]**
(v)	acid / viscous magma has relatively low temperature therefore cools / crystallises / solidifies before reaching surface volatiles emerge as magma rises aiding crystallisation magmas generated too deep to reach surface / crust is thick (in this area) discussion of hydrous granite solidus curve	**[2]**
(vi)	granite / granodiorite / diorite / any other named coarse grained acidic or acidic intermediate rock	**[1]**
3(a)(i)	degree to which particles are the same size spread of grain size around a mean measure of variation of grain size well sorted = all same size poorly sorted = wide range of grain sizes diagram can act as text	**[2]**
(ii)		**[1]**
	$\frac{3.2 - 0.3}{2}$ or $\frac{3.2 - 0.2}{2}$ =1.45 =1.5 allow ecf 1 mark for correct reading from graph into equation 2 marks for correct answer only in range above	**[1]**
(iii)	poorly sorted allow ecf	**[1]**
(b)(i)	J rudaceous- pebbles / gravels / boulders /coarse K argillaceous / muds / silts / fine	**[1]** **[1]**
(ii)	K is low energy and J is high energy / K fine material deposited last, J heavy material deposited first	**[1]**
(c)(i)	angular / sub angular fragments / poorly sorted = <u>texturally</u> immature many fragment types / polymictic / contains potash feldspar = <u>compositionally</u> immature allow ecf	**[1]**
(ii)	breccia / breccia-conglomerate / conglomerate / arkose allow ecf	**[1]**
(iii)	alluvial fan allow ecf	**[1]**
(d)(i)	playa / ephemeral	**[1]**
(ii)	salt <u>crystals</u> form when lake dries up salt crystals dissolve mould infilled with sediment / secondary mineral shape of original salt crystal preserved	**[2]**

Question Number	Answer	Max Mark
4(a)(i)	altered / changed area of (country) rock / baked by heat from intrusion / contact metamorphism	[1] [1]
(ii)	in the north the edge of the intrusion is dipping at a shallow angle in the south the dip of the granite is steep (diagram OK) eroded more in north / topography shows slope more jointing / fractured in north general statement of width depends on shape of intrusion max = 1 general statement of width depends on dip max = 1	[2]
(iii)	L = metaquartzite / quartzite M = marble N = hornfels P = spotted rock / spotted slate / andalusite slate	[1] [1] [1] [1]
(iv)	no mineral alignment heat only lack of pressure / some minerals are equidimensional / lack of platy minerals If state contact metamorphism then max 1 equivalent to heat only and no pressure	[2]
(b)		
(i)	correct labelling of the polymorph phase fields Q = kyanite R = sillimanite S = andalusite 1 or 2 correct= 1 3 correct= 2	[2]
(ii)	andalusite / S ecf	[1]
(iii)	490 – 510 ^{o} C, 360 –385 Mpa	[1]
(iv)	chlorite, biotite, garnet, kyanite and sillimanite any 3 in correct order =1 All 5 in correct order = 2	[2]

Question Number	Answer	Max Mark
5(a)(i)	areas where a river meets the sea / lake / river mouth	[1]
	low current / no current in sea so sediment deposited / deposition greater than erosion	[1]
(ii)	foresets – either of the sandstones	[1]
	bottomsets – shale	[1]
	topsets – coal and/or seat earth	[1]
(iii)	flat topsets near to shore	[1]
	foresets on delta front / slope NOT vertical	[1]
	bottomsets offshore on continental shelf	[1]
(b)	humid tropical / equatorial / warm and damp	
	rich vegetation / high primary productivity /rain forest / swamp / marsh	
	anaerobic conditions when trees die / stagnant / lack oxygen / anoxic	
	material covered rapidly by fine sediment before vegetation decays	
	compression due to burial to turn peat to coal / coalification	
	Any 3	[3]
(c)(i)	1-2 bars drawn accurately	[1]
	3-4 bars drawn accurately	[1]
(ii)	percentage increase in carbon and decrease in volatiles and sediment	[1]
	using numerical information from table and / or chart	[1]
(iii)	coalification	[1]
6	**Crystal grain size**	
	>5mm = coarse grained; 1-5mm = medium grained; <1mm = fine grained / glassy	
	those cooled slowly at depth = e.g. granite / plutonic igneous rocks / batholiths	
	hypabyssal igneous rocks / at intermediate depth e.g. dolerite / sills / dykes	
	volcanic /extrusive / fast cooled at surface / e.g. basalt lavas	
	AW	
	general statement linking grain size with cooling rate	[4]
	Silica content	
	acidic = >66% SiO_2 +/- 1%	
	intermediate = 52 – 66% SiO_2 +/- 1%	
	basic = 44-52% SiO_2 +/- 1%	
	ultrabasic = < 44% SiO_2 +/- 1%	
	leucocratic (light coloured) / mesocratic / melanocratic (dark coloured) (only given once)	[4]

Question Number	Answer	Max Mark
6 cont'd	**Mineralogy** acid = quartz, potash feldspar, plagioclase, micas ¾ intermediate = potash, plagioclase, quartz, hornblende, biotite ¾ basic = plagioclase and pyroxene Ultrabasic = pyroxene, olivine / monomineralic or plagioclase, acid = Na rich / basic = Ca rich potash only acid / intermediate quartz decreases from acid – basic pyroxene basic / possibly intermediate / possibly ultrabasic olivine ultrabasic / basic acid = felsics / basic more mafics leucocratic (light coloured) / mesocratic / melanocratic (dark coloured) (only given once) table alone max 5 QWC mark for linking each method of classification to igneous rocks (1)	**[4]**
7	Oolitic limestone: nucleus rolled along shallow beach or sand bank high energy conditions water saturated in calcium carbonate calcium carbonate (aragonite) deposited around nucleus concentric layers evaporation / precipitation from sea water Micritic limestone: low energy conditions calcareous algae, break down when algae die in lagoon behind sheltered barrier food for organisms living in lagoon evaporation of sea water precipitation of calcium carbonate chalk is a specific form of micrite Reef / fossiliferous limestone: found on barrier or front of barrier either well preserved (barrier) or fragmental (front) due to moderate or high energy conditions fossils cemented by calcite in form of sparite which is post depositional Mark diagrams as text	**[4]** **[4]** **[4]** **[8]**
	QWC mark for linking each type of limestone to different environments (1)	
	Paper Total	**[100]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1(a)(i)	2	2		4
1(a)(ii)	2	1		3
1(b)(i)		1	1	2
1(b)(ii)		1	1	2
1(b)(iii)		3	1	4
1(b)(iv)	1	1		2
2(a)(i)	1	2		3
2(a)(ii)		2		2
2(b)	1	1		2
2(c)	2			2
2(d)(i)		1		1
2(d)(ii)			1	1
2(d)(iii)		1		1
2(d)(iv)		1		1
2(d)(v)	1	1		2
2(d)(vi)	1			1
3(a)(i)	2			2
3(a)(ii)		1	1	2
3(a)(iii)		1		1
3(b)(i)	1	1		2
3(b)(ii)		1		1
3(c)(i)		1	1	2
3(c)(ii)	1			1
3(c)(iii)	1			1
3(d)(i)	1			1
3(d)(ii)		2		2
4(a)(i)	1	1		2
4(a)(ii)		2		2
4(a)(iii)	2	2		4
4(a)(iv)	2	2		2
4(b)(i)		1	1	2
4(b)(ii)	1			1
4(b)(iii)		1		1
4(b)(iv)		1		2
5(a)(i)	2			2
5(a)(ii)	2	1		3
5(a)(iii)	1	2		3
5(b)	1	1	1	3

Question	AO1	AO2	AO3	Total
5(c)(i)	1	1		**2**
5(c)(ii)		2		**2**
5(c)(iii)	1			**1**
6	5	4		**10**
7	5	3	2	**10**
Totals	**42**	**48**	**10**	**100**

QWC is applied across questions 6 and 7 where the extended writing requires the candidates to choose the structure, style and specialist terms used.

3 marks	Information is organised clearly and coherently, so that the candidate communicates effectively, uses a wide range of specialist terms with precision. Spelling, punctuation and grammar are accurate so that the meaning is clear. The form and style of writing are appropriate to purpose and to complex subject matter.
2 marks	Information is organised, uses some specialist terms and spelling, punctuation and grammar are accurate so that the meaning is clear. The form and style of writing are appropriate to purpose and to complex subject matter.
1 mark	Information is poorly organised with a limited range of specialist terms used appropriately and spelling, punctuation and grammar are generally accurate with few errors.
0 marks	Organisation is poor, leading to a failure to communicate knowledge and ideas. There are significant errors in the use of language, spelling, punctuation and grammar which makes the candidate's meaning uncertain.

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