

Tuesday 12 June 2012 – Morning

A2 GCE GEOLOGY

F795 Evolution of Life, Earth and Climate

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- Electronic calculator
- Ruler (cm/mm)

Duration: 1 hour 45 minutes




Candidate forename		Candidate surname	
--------------------	--	-------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

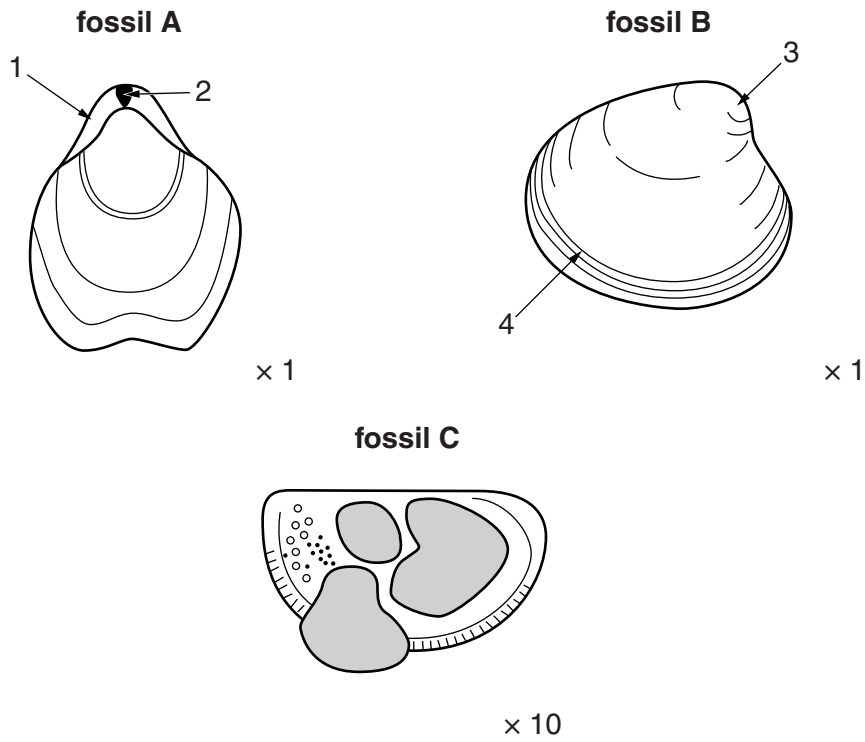
INSTRUCTIONS TO CANDIDATES

- 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.
- 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.
- This document consists of **16** pages. Any blank pages are indicated.

1 **A, B** are **C** are fossils which possess two valves.



(a) (i) Identify the group for each of the fossils above.

fossil	group
A	
B	
C	

[3]

(ii) Label the morphological features **1** to **4**.

1 2

3 4

[3]

(iii) Describe the function of morphological feature **2**.

.....
 [1]

(iv) Describe the environment in which fossil **C** lived.

.....
 [1]

(v) Describe the difference in symmetry between fossils **A** and **B**.

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

(b) Describe and explain how the Jurassic fossils **A** and **B** may be found in Quaternary rocks.

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

(c) Explain why it is difficult to infer the mode of life of the extinct fossil groups of trilobites and dinosaurs. Use different reasons for each group.

trilobites
.....
.....
.....
.....
.....
.....
.....
.....
.....
..... [4]

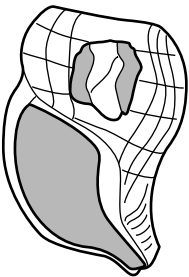
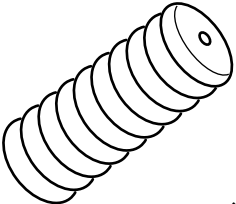
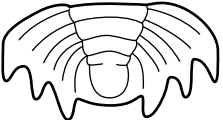
dinosaurs
.....
.....
.....
.....
..... [4]

[Total: 15]

2 (a) Below are diagrams of three fossil fragments **D**, **E**, and **F**. Complete the table below

- (i) to identify and describe the fossil fragment [4]
- (ii) and circle the energy level and the depth of the water in the environment where it lived. [2]

The first one has been done for you.

fossil	identification and description	environment
<p>fossil D</p>  <p style="text-align: right;">x 1</p>	<p>a gastropod shell fragment with body chamber present and broken first whorl showing central structure</p>	<p>energy level</p> <p>low medium <u>high</u></p> <p>water depth</p> <p><u>littoral</u> shallow marine deep marine</p>
<p>fossil E</p>  <p style="text-align: right;">x 1</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>energy level</p> <p>low medium high</p> <p>water depth</p> <p>littoral shallow marine deep marine</p>
<p>fossil F</p>  <p style="text-align: right;">x 2</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>energy level</p> <p>low medium high</p> <p>water depth</p> <p>littoral shallow marine deep marine</p>

(b) Coprolites are a type of trace fossil which are interpreted as fossil dung. Explain how they can give us information about the palaeoenvironment that was previously unknown.

.....

.....

.....



.....

[2]

(c) Aragonite alters to calcite over time. Explain why this process happens.

.....
 [1]

(d) The table below shows data gathered from three bedding planes in limestone. The fossils found are solitary corals and bivalves.

		number of solitary corals in life position	number of bivalve shells		total number of bivalve shells	% 'convex up' bivalve shells
			'convex down' 	'convex up' 		
bedding plane	1	12	58	52		
	2	3	25	110		
	3	8	47	40		

(i) Complete the table to show:
 1. the total number of bivalve shells on each bedding plane;
 2. the percentage of convex up bivalve shells for bedding planes 1, 2 and 3. [2]

(ii) Analyse the information from the solitary corals and bivalves to suggest the conditions that existed throughout the deposition of this limestone. Clearly link your interpretation to the evidence for each bed.

.....

 [4]

(iii) Give one other piece of information that you might look for in the field to verify your interpretation for part (ii) above.

.....
 [1]

[Total: 16]

Turn over

3 (a) The table below shows information about fossil cephalopods.

(i) Complete the first column of the table by matching the fossil to its best description. Choose fossil types from the list below. Each fossil may be used more than once.

ammonite belemnite ceratite goniatite nautiloid

fossil	description
	has an evolute shell with external ornament
	involute shell with sutures that show smooth saddles and frilly lobes
	has a guard, a phragmocone and simple sutures
	has a chambered shell which lacks external ornament and is still alive today
	has an evolute shell with an external sulcus and keel
	has an involute shell with smooth saddles and angular lobes

[5]

(ii) Describe how fossil cephalopods controlled their vertical and horizontal position in the water column.

vertical

.....

horizontal

..... [2]

(b) (i) Describe how a heteromorph ammonite differs from other forms of ammonite.

.....

..... [1]

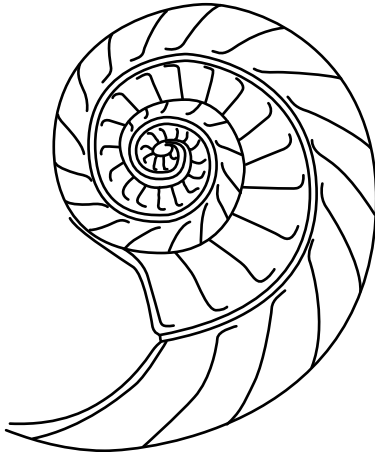
(ii) Suggest its probable mode of life.

.....

..... [1]

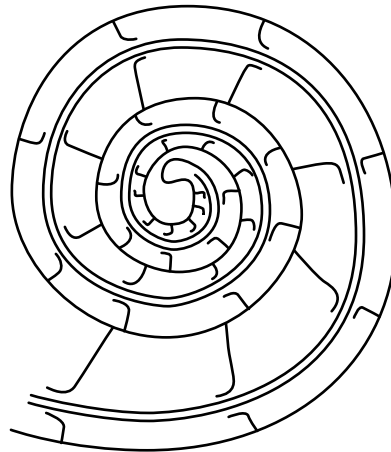
(c) Cross-section views of two different members of the cephalopods are shown below.

fossil cephalopod G



× 1

fossil cephalopod H



× 1

(i) Label the protoconch and aperture on fossils **G** and **H**. [1]

(ii) Describe the change in orientation of the septal necks between the two cephalopods.

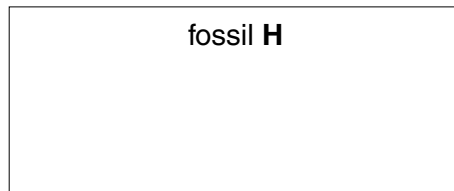
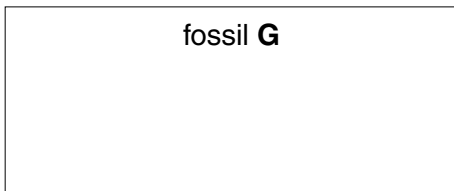
 [1]

(iii) What is the function of the septal necks?
 [1]

(iv) Describe the change in the siphuncle between the two cephalopods. Shade and label the siphuncle on both fossils **G** and **H** to show the change.

 [2]

(v) Draw the correct suture line for fossils **G** and **H**.



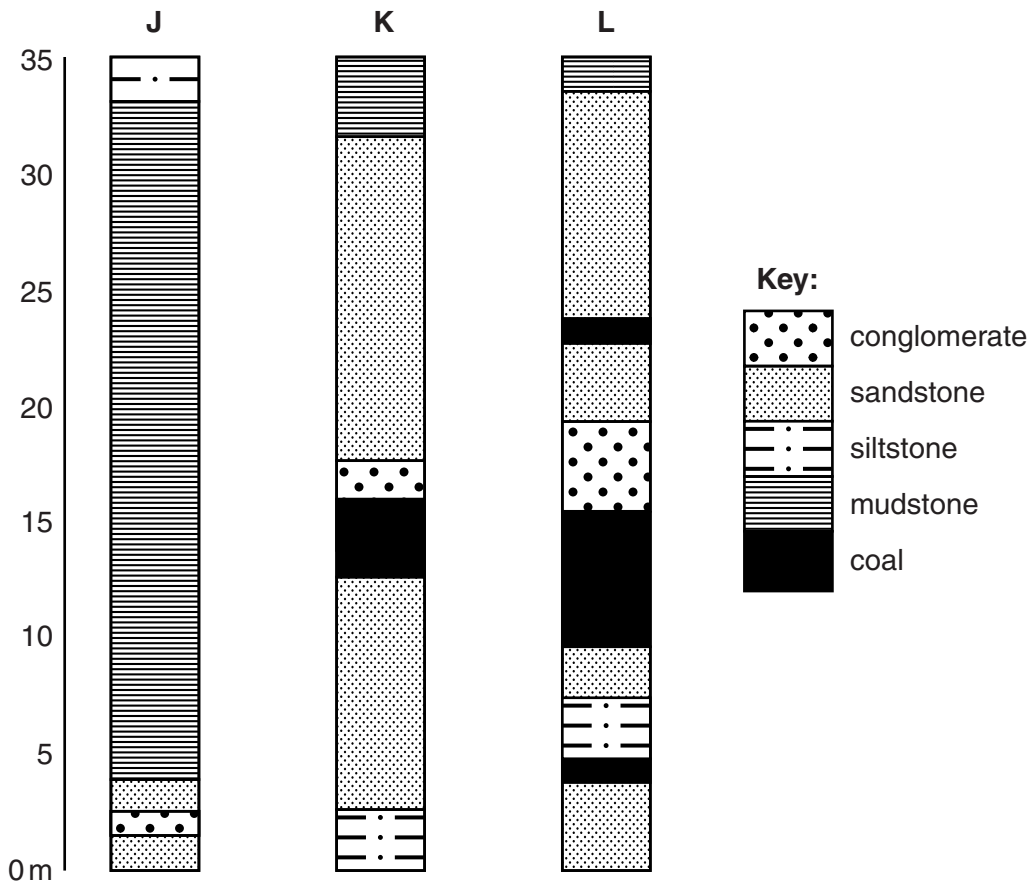
[2]

(d) Explain why ammonites are excellent zone fossils.

 [2]

[Total: 18]
 Turn over

4 (a) Study the diagrams (J, K and L) below which show three simplified borehole logs, taken 5 km apart.



- (i) Using lithostratigraphic methods, correlate the coal and the mudstone in the borehole logs with dashed lines. [2]
- (ii) Describe the broad environments of deposition seen in boreholes J and L. Suggest a reason for the difference between them.

.....

.....

.....

.....

.....

.....

.....

[3]

(b) Chronostratigraphy can also be used to correlate rocks. Describe how varve deposits can be used to correlate rock sequences.

.....

.....

.....

.....

.....

.....

..... [3]

(c) The table below shows information about the ranges of some fossil groups.

	fossil groups		
	graptolites	tabulate corals	trilobites
first appearance	Upper Cambrian		Lower Cambrian
extinction		Upper Permian	

(i) Complete the table. [2]

(ii) Describe and explain **three** possible causes for the extinction of tabulate corals and many other organisms at the same time.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 14]

5 (a) Explain what is meant by the term Darwinian evolution.

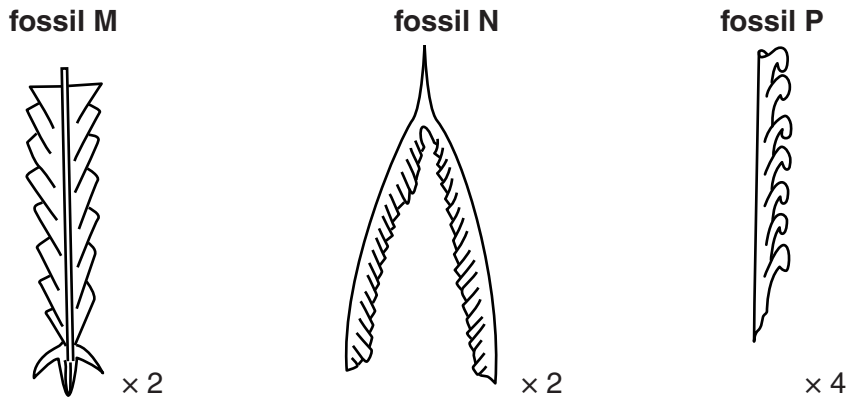
.....

.....

.....

..... [2]

(b) Fossils **M**, **N** and **P** are members of the same fossil group that evolved throughout the Palaeozoic.



(i) What substance are the skeletons of fossils **M**, **N** and **P** composed of?

..... [1]

(ii) Describe the form of fossil **N** above. Circle the correct answer.

scandent pendant reclined [1]

(iii) Place fossils **M**, **N** and **P** in evolutionary order.

youngest

.....

oldest

[2]

(iv) Describe the likely mode of life of these fossils.

.....

.....

.....

.....

.....

..... [3]

- (c) (i) Birds are thought to have evolved from their closest relatives, the theropod dinosaurs, during the Jurassic. Describe **two** features that both theropod dinosaurs and birds share.

.....

 [2]

- (ii) Explain how **one** of these features is a useful adaptation for birds.

.....
 [1]

- (iii) *Archaeopteryx* is thought to be bird-like and may represent an intermediate form between dinosaurs and birds. Describe **one** feature of *Archaeopteryx* that can be seen when it is exceptionally preserved, that suggests that it may be a bird ancestor.

.....
 [1]

- (d) The table below compares lobe-finned fish such as coelacanths and early amphibians. Complete the table using a tick or a cross to indicate whether each statement is true or false.

statement	true or false	
	✓	X
early amphibians and lobe-finned fish had limbs in the same position on their bodies		
the lobe-finned fish had a narrower skull than the amphibians		
early amphibians had small bony scales on their skin		
early amphibians and lobe-finned fish had complex teeth		
early amphibians and lobe-finned fish had claws		

[4]

[Total: 17]

- 6 Compare the similarities and differences between regular and irregular echinoids. Labelled diagrams are essential to illustrate your answer.



You should structure your answer to compare the morphology of the two types of echinoid.

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

