Surname	Centre Number	Candidate Number
First name(s)		2



#### **GCE A LEVEL**

O21-A480U20-1



**TUESDAY, 12 OCTOBER 2021 – MORNING** 

#### **GEOLOGY – A level component 2 Geological Principles and Processes**

1 hour 45 minutes

	For Ex	For Examiner's use only		
	Question	Maximum Mark	Mark Awarded	
	1.	18		
	2.	17		
ADDITIONAL MATERIALS	3.	11		
In addition to this examination paper you will need	4.	13		
• the Mineral Data Sheet;	5.	14		
• a calculator; • a ruler.	6.	17		
	Total	90		

#### INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid. You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer all questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

#### INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

The assessment of the quality of extended response (QER) will take place in questions 1 and 6.





Examiner Refer to Figure 1a. (a) State the name of mineral Y. You may wish to refer to the Mineral Data Sheet. [1] (i) Name of mineral Y: Describe the process by which the shells of fossils A, B and C have become (ii) composed of mineral Y. [3] (b) Refer to Figure 1a and Figure 1b. The three fossil cephalopods (A, B and C) on Figure 1a were collected from three (i) different sites labelled 1, 2 and 3 on Figure 1b. State from which site (1, 2 or 3) fossil A was most likely to have been collected. Explain your answer. [3] Fossil A was collected from site \_\_\_\_\_ (ii) Boundary Z has been interpreted as an unconformity. Explain the evidence on Figure 1b for this interpretation. [4]

3



only

c) Th	e three fossil cephalopods (A, B and C) on Figure 1a are useful <i>'zone fossils'</i> .
(i)	) Explain what is meant by the term <i>'zone fossil'</i> . [1]
 (ii)	) Evaluate the use of cephalopods as zone fossils. You should refer to <b>Figure 1a</b> and <b>Figure 1b</b> in your answer. [6 QER]
·····	
<b>.</b>	
·····	
<b>.</b>	
·····	
<b>.</b>	



## **BLANK PAGE**

5

### **PLEASE DO NOT WRITE ON THIS PAGE**









Examiner only State what is meant by 'reversed magnetic polarity'. (b) (i) [1] Using your knowledge, explain how rocks of the oceanic crust contain a record of (ii) the Earth's magnetic polarity. [3] Explain two possible reasons for the variation in the width of the magnetic stripes (iii) in Figure 2. [4] (C) Describe the processes by which solid mantle from location X forms new oceanic (i) crust at location Y. [3] (ii) Explain how the formation of new oceanic crust at location Y may produce a driving force for lithospheric plate motion. [2] 17

7



A480U201 07





xaminer only

> A480U201 09

(6	a) Ref	er to <b>Figure 3a</b> .
	(i)	<ul> <li>State which one of the two types of lava flow (summit or flank) on Figure 3a presents the greatest risk to the local population. Explain your answer. [1]</li> <li>Lava flow type:</li> <li>Explanation:</li> </ul>
	(ii)	<ul> <li>Describe the features of <b>one</b> type of volcanic hazard, other than lava flows, that may present a risk to the local population around Etna. [3]</li> <li>Volcanic hazard:</li> </ul>
		Hazardous features:
	<b>.</b>	







© WJEC CBAC Ltd.

(A480U20-1)

# **BLANK PAGE**

11

### **PLEASE DO NOT WRITE ON THIS PAGE**





4. Figure 4 shows photographs of the polished surfaces of two meteorites; a stony (chondrite) meteorite and an iron meteorite.

12



(b) Table 1 types of	shows the abundand meteorite in <b>Figure</b>	ce of elements in the <b>4</b> .	e Earth's crust, who	le Earth and the two
Element	Abundance in the Earth's crust (%)	Abundance in the whole Earth (%)	Abundance in stony (chondrite) meteorite (%)	Abundance in iron meteorite (%)
Oxygen	46	30	32	
Silicon	27	15	14	
•	8.1	1.4	0.90	
Iron	6.3	32	30	88
•	5.0	1.5	1.1	
Magnesium	2.9	14	12	
Sodium	2.3	0.40	0.55	
Potassium	1.5	0.20	0.10	
Others	0.9	5.5	9.35	12

Table 1

#### Refer to Table 1.

- (i) Using your knowledge, complete **Table 1** by stating the name of the two missing elements. [2]
- (ii) Compare the relative abundance of iron in the Earth's crust, whole Earth, stony (chondrite) meteorites and iron meteorites. [2]

(iii) 'The data in **Table 1** provides evidence for the origin of the layered structure of the Earth.' Explain this statement with reference to the variation in the abundance of iron in the Earth and meteorites. [4]

.....

![](_page_12_Picture_6.jpeg)

![](_page_12_Picture_8.jpeg)

13

Examiner only

![](_page_13_Figure_0.jpeg)

The sedimentary sequence in Figure 5a has been sub-divided into three facies (1, 2 and (b) 3) which have been interpreted as having been deposited in different marine and nonmarine environments.

15

Using the information on Figure 5a only, evaluate the conclusion that 'facies 1 was deposited in a low energy, marine environment'. [4]

![](_page_14_Picture_4.jpeg)

Refer to Figure 5a.

(a)

[2]

![](_page_15_Figure_0.jpeg)

	(ii)	A student stated that <i>'volcanic tuff layers and boundaries between facies types are both diachronous'</i> . Evaluate the student's statement with reference to <b>Figure 5b</b> . [2]	only
d)	Refe	r to <b>Figure 5a</b> and <b>Figure 5b</b> .	
	(i)	Draw on <b>Figure 5b</b> a vertical line to represent the position where a borehole would record the sedimentary sequence in <b>Figure 5a</b> . [1]	
	(ii)	Explain how the data on <b>Figure 5a</b> and <b>Figure 5b</b> can be used to illustrate Walther's Law.	
			14

![](_page_16_Picture_2.jpeg)

![](_page_17_Picture_0.jpeg)

![](_page_17_Picture_1.jpeg)

![](_page_18_Figure_0.jpeg)

![](_page_18_Picture_1.jpeg)

Turn over.

![](_page_19_Figure_0.jpeg)

![](_page_19_Picture_1.jpeg)

![](_page_20_Figure_0.jpeg)

Question	Additional page if required	Examiner
number	Write the guestion number(s) in the left-hand margin.	only
		1
		1
		1
		1

![](_page_21_Picture_1.jpeg)

Acknowledgements			
Figure 1a	Understanding Geology. Webster, D. 1987. Oliver and Boyd, Harlow, 197pp.		
Figures 2	https://earthref.org/drupal/content/magnetic-anomaly-mapping		
Figure 3a	https://www.wired.com/2010/08/etna-week-part-2-the-current-dynamics-and- activity-of-etna/		
Figure 3b	https://www.nap.edu/read/24650/chapter/6		
Figure 4	Stony meteorite. https://www.crystalclassics.co.uk/product/ Iron meteorite. http://www.meteorite-list-archives.com/2015/oct/0087.html		
Table 1	Meteorites. https://www.permanent.com/meteorite-compositions.html Earth. http://periodictable.com/Properties/A/CrustAbundance.html		
Figure 5b	Analysis of floodplain sedimentation, avulsion style and channelized fluvial sandbody distribution in an upper coastal plain reservoir: Middle Jurassic Ness Formation, Brent Field, UK North Sea. Y. S. Flood and G.J. Hampson. 2016. Geological Society, London, Special Publications, 444, 109-140, 29		
Figure 6b	https://www.chegg.com/homework-help/questions-and-answers/problem-1- stress-strain-curve-berea-sandstone-sample-uniaxial-compression-test-given- figur-q26685241		
Figure 6c	Foundations of structural geology. Park, R.G. 1989. Blackie, London, 148pp.		

![](_page_22_Picture_2.jpeg)

# **BLANK PAGE**

24

### PLEASE DO NOT WRITE ON THIS PAGE

![](_page_23_Picture_2.jpeg)