Surname	Centre Number	Candidate Number
Other Names		2

GCE A Level

1215/02

S17-1215-02

GEOLOGY – GL5

Thematic Unit 2
Geology of Natural Resources

THURSDAY, 8 JUNE 2017 – AFTERNOON

ONE of TWO units to be completed in 2 hours

	For Examiner's use only		
	Question	**Maximum Mark**	**Mark Awarded**
Section A	**1.**	**15**	
Section B	**2.**	**25**	
	3.		
	4.		
	Total	**40**	

1215
020001

ADDITIONAL MATERIALS

In addition to this and one other examination paper, you will need a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Write your name, centre number and candidate number in the spaces at the top of this page.
Answer **question 1** in Section A (15 marks) and **one** question from Section B (25 marks).

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the necessity for good English and orderly presentation in your answers.

Examiner only

SECTION A

1. **Figure 1a** shows the depositional environment of a sedimentary ore deposit showing the concentration of uraninite (an ore of uranium). **Table 1a** lists some of the properties of uraninite.

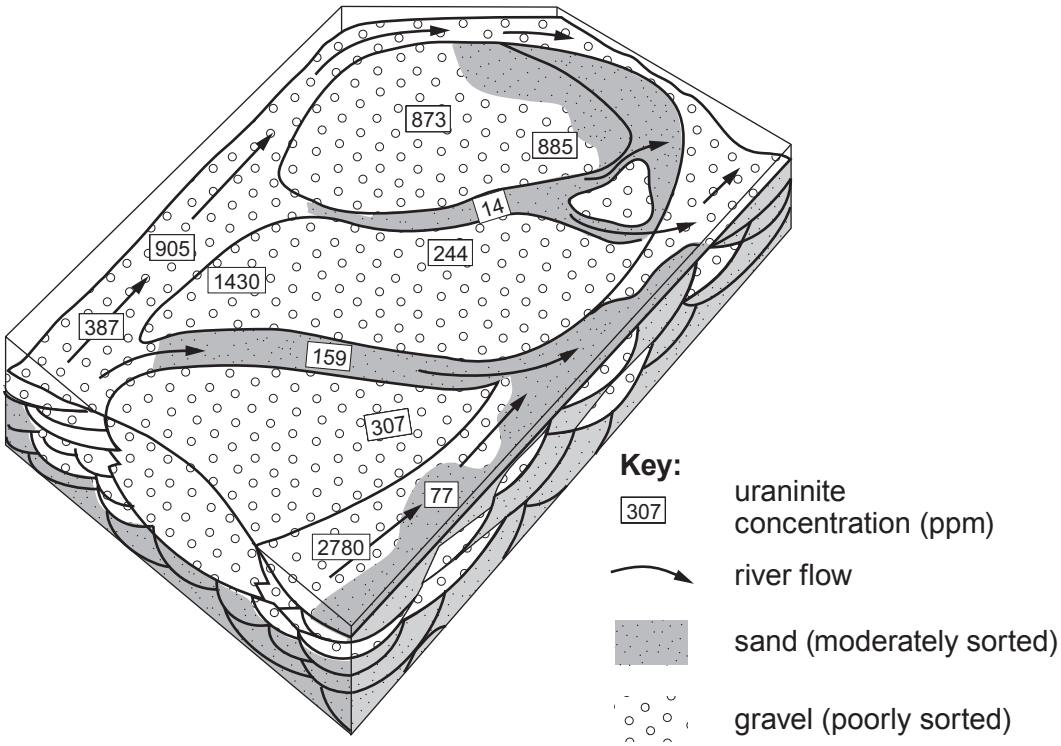


Figure 1a

chemical compositon	hardness	cleavage	relative density	solubility
UO_2	5-6	poor	10.63 – 10.95	insoluble

Table 1a

Refer to **Figure 1a** and **Table 1a**

(a) (i) State the type of sedimentary ore deposit shown in **Figure 1a**. [1]

.....

(ii) Complete **Table 1b** to show the range of concentration of uraninite (in ppm) in the gravels in **Figure 1a**. [2]

	maximum	minimum	range
sand	159	14	145
gravel	•	•	•

Table 1b

Examiner only

(iii) Explain how **two** properties of uraninite enable it to be concentrated in such an ore deposit. [2]

1. .....

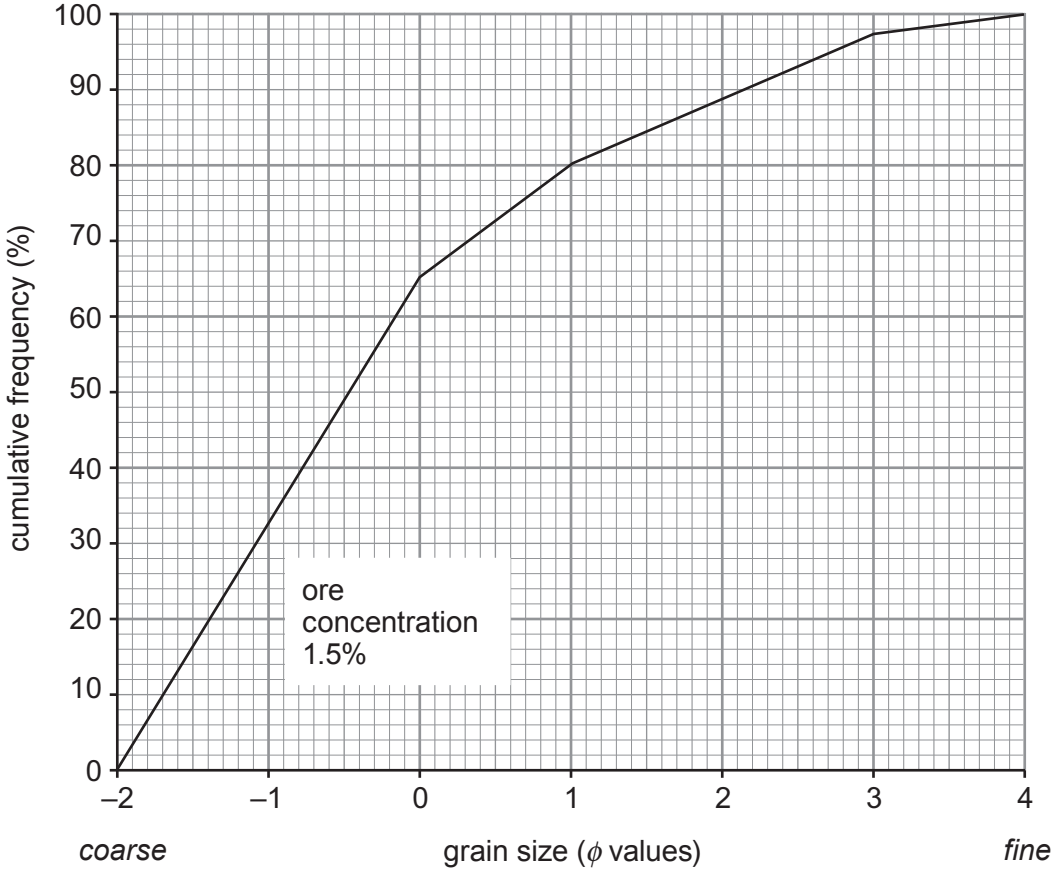
.....

2. .....

.....

1215 020003

Figure 1b is a graph showing grain size distribution of a sample of ore-bearing river sediment (sample **X**) with an ore concentration of 1.5%. **Figure 1c** shows the relationship between ore concentration and the coefficient of sorting for samples taken from the same river.



Coefficient of sorting = $\frac{\phi_{84} - \phi_{16}}{4} + \frac{\phi_{95} - \phi_{5}}{6.6}$

Note: ϕ_{50} is 50% cumulative frequency

Figure 1b

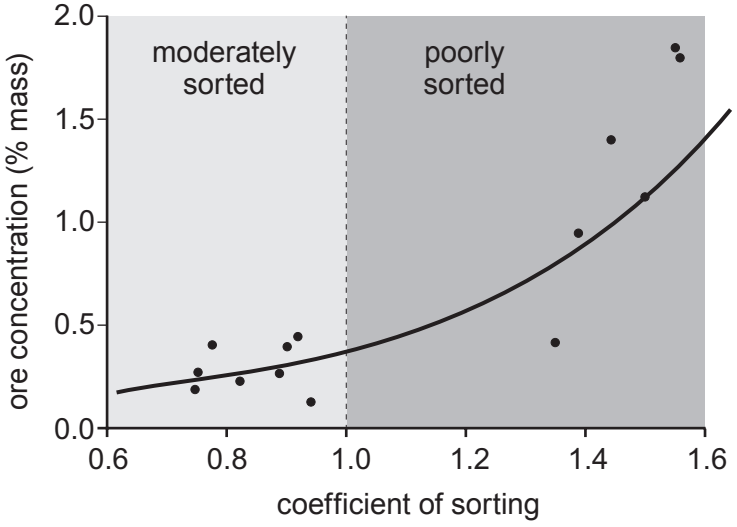


Figure 1c

Examiner only

Refer to **Figures 1b** and **1c**.

(b) (i) Using **Figure 1b**:

1. calculate the coefficient of sorting of sample **X**. Show your working. [3]

2. Plot this result onto **Figure 1c**.

(ii) Describe the relationship between the concentration of the ore mineral and the coefficient of sorting shown in **Figure 1c**. [2]

.....

.....

.....

(c) Refer to **Figure 1a**, **Table 1a** and **Figure 1c**.

Explain why uraninite grains are more likely to concentrate in poorly sorted gravels than moderately sorted sands. [3]

.....

.....

.....

.....

(d) Suggest a suitable planning control that could be used to limit the adverse effects of **one** named environmental problem that might be caused by the extraction of a geological raw material.

environmental problem:

planning control: [2]

.....

.....

.....

1215 020005

SECTION B

Answer **one** *question only.*

Write your answer in the remaining pages of this booklet.

2. *"Economically viable hydrocarbon resources can only be located using geophysical prospecting techniques."*
Evaluate this statement. [25]

3. *(a)* Explain how igneous processes can form economically valuable mineral resources.

(b) Evaluate the significance of Bowen's Reaction Series in forming ore minerals. [25]

4. *(a)* Describe the processes of formation of:

1. china clay

and

2. fluorite **or** barite (baryte)

(b) Evaluate the application and limitations of prospecting using mapping and satellite remote sensing techniques. [25]

Examiner only

Examiner only

Examiner only

Examiner only

END OF PAPER

BLANK PAGE

Acknowledgements:

Question1: Burton J.P & Fralick P. *Economic Geology* Vol. 98, 2003, pp 985-1001

