

Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A Level – LEGACY

1211/01



GEOLOGY – GL1 Foundation Unit

MONDAY, 14 MAY 2018 – MORNING

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	15	
2.	15	
3.	16	
4.	14	
Total	60	

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ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- the Mineral Data Sheet;
- a calculator;
- a protractor.

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 **all** questions in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

You are reminded that marking will take into account the use of examples and the quality of communication used in your answers.

Answer all questions.

1. **Figure 1a** shows a coastal exposure of a sequence of sedimentary rocks and one igneous body. All sedimentary rock units are the correct way-up.

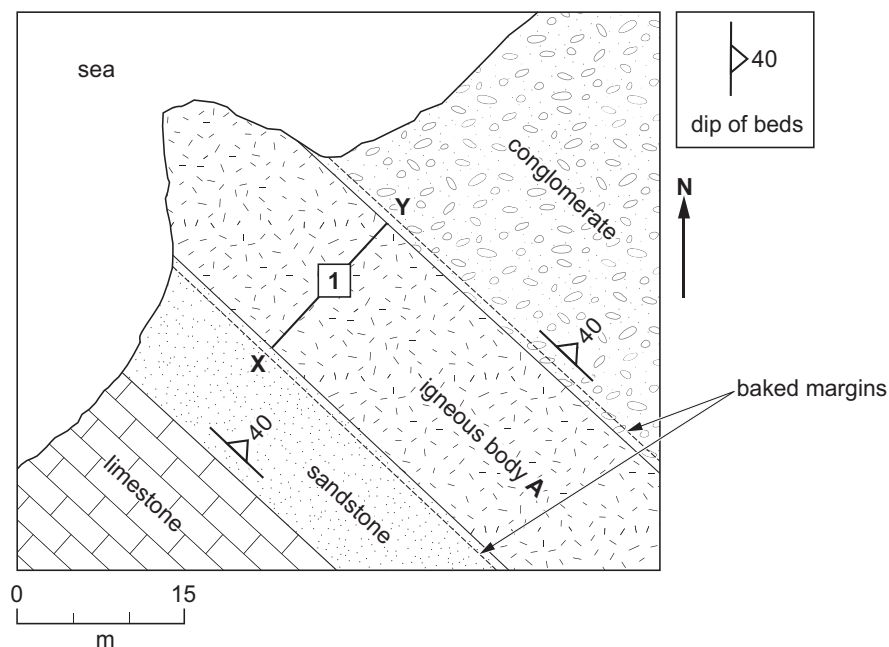


Figure 1a

Refer to **Figure 1a**.

- (a) (i) State the name of the oldest rock shown on **Figure 1a**. [1]

- (ii) State the trend (strike) of igneous body **A** shown on **Figure 1a**. [1]

Table 1b shows how the crystal size of igneous body **A** varies along line **X – Y** on **Figure 1a**.

Distance from X (m)	0	3	6	9	12	15
Average crystal size (mm)	0.5	5.0	8.0	8.0	6.0	0.5

Table 1b

- (b) Refer to **Figure 1a** and **Table 1b**.

- (i) Plot a line graph on **Figure 1c** by using the data in **Table 1b**. [2]

- (ii) Explain the variation in crystal size between locations **X** and **Y** in **Figure 1a** and **Figure 1c**. [2]

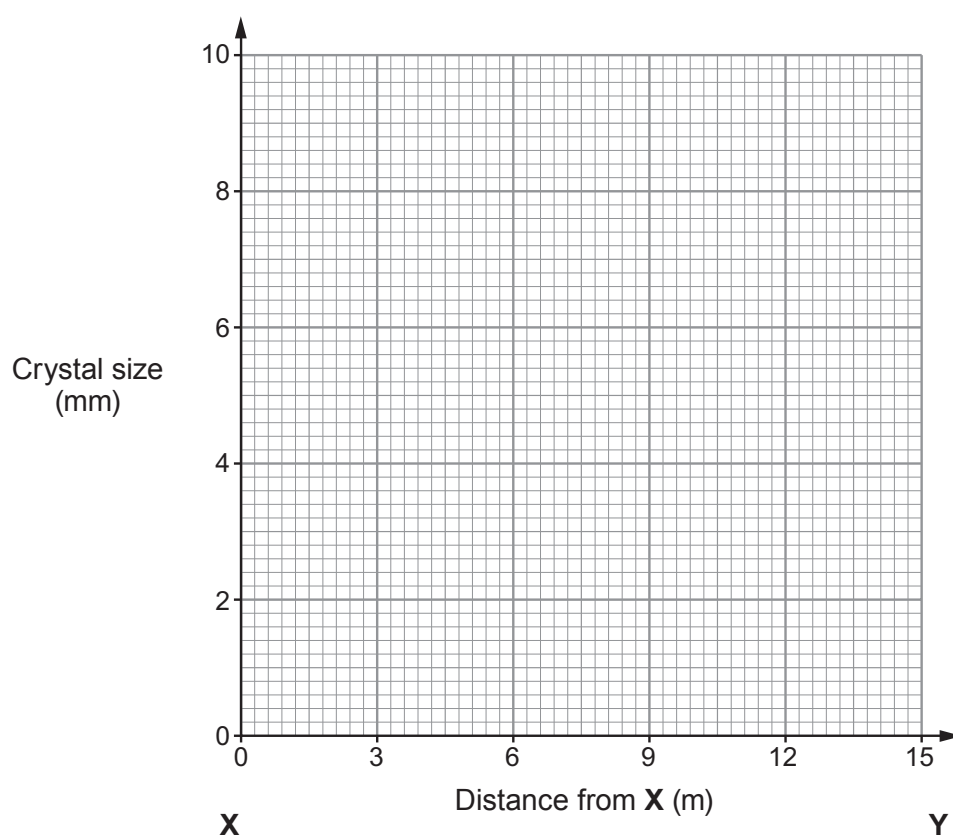


Figure 1c

(c) **Figure 1d** is a photograph of the igneous rock taken at location **1** on **Figure 1a**.

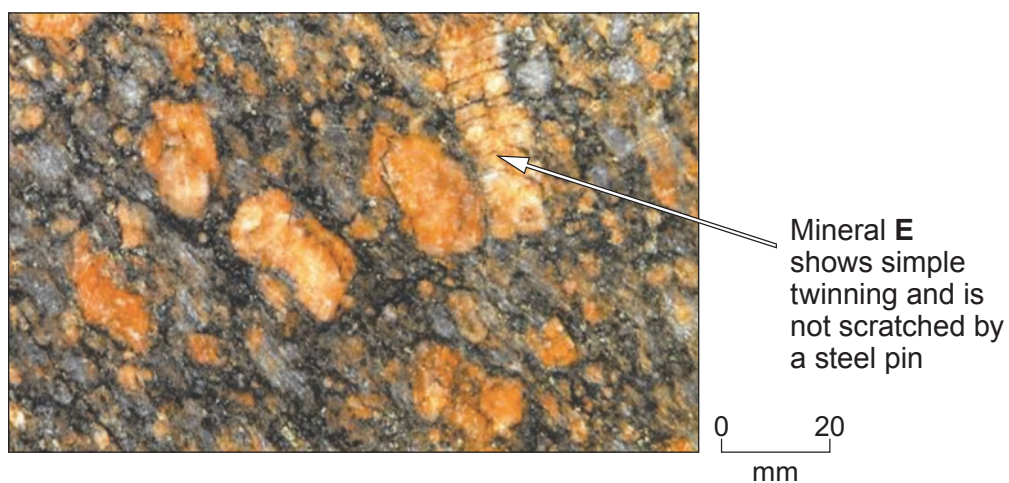


Figure 1d

- (i) State the name of mineral **E** shown in **Figure 1d**. You may wish to refer to the **Mineral Data Sheet**. [1]

- (ii) Describe the texture of the igneous rock shown in **Figure 1d**.

[2]

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- (iii) Explain how the texture of the igneous rock shown in **Figure 1d** may have formed.

[2]

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- (iv) A student concluded that igneous body **A** is a dyke. Evaluate this statement with reference to **Figure 1a**, **Figure 1c** and **Figure 1d**.

[4]

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2. **Figure 2** shows the geology exposed in a cliff face showing the true dip of the beds.

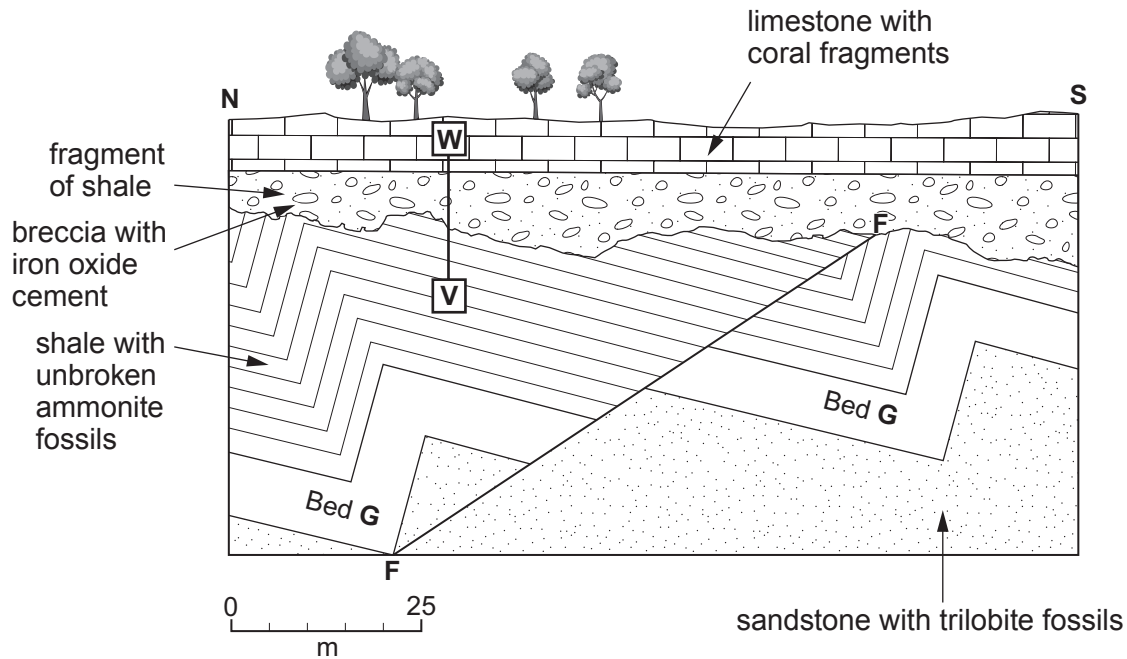


Figure 2

Refer to **Figure 2**.

- (a) Describe **two** pieces of evidence from **Figure 2** that suggest the beds are the correct way up. [2]

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- (b) Complete **Table 2a** below to identify the characteristics of the fold structures shown in **Figure 2**. [4]

dip direction of the fold axes	•
dip angle of the fold axes	• degrees
strike orientation of the axial plane traces	•
symmetry of the folds	•

Table 2a

(c) Refer to the fault labelled **F–F** on **Figure 2** which is a dip-slip fault.

- (i) Name the type of fault **F–F** shown on **Figure 2**, giving **one** reason for your answer. [2]

Type of fault

Reason

- (ii) Using **Bed G**, measure and record in **Table 2b** the amount of vertical and horizontal displacement that has occurred across fault **F–F** and state the type of tectonic stress involved. [3]

vertical displacement (throw)	•	metres
horizontal displacement	•	metres
type of tectonic stress	•	

Table 2b

- (d) Describe the evidence from **Figure 2** that suggests a change in the **energy** of the environment of deposition of the sedimentary rocks from the location **V** to **W**. [4]

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3. **Figure 3** is a geological cross section showing igneous, sedimentary and metamorphic rocks.

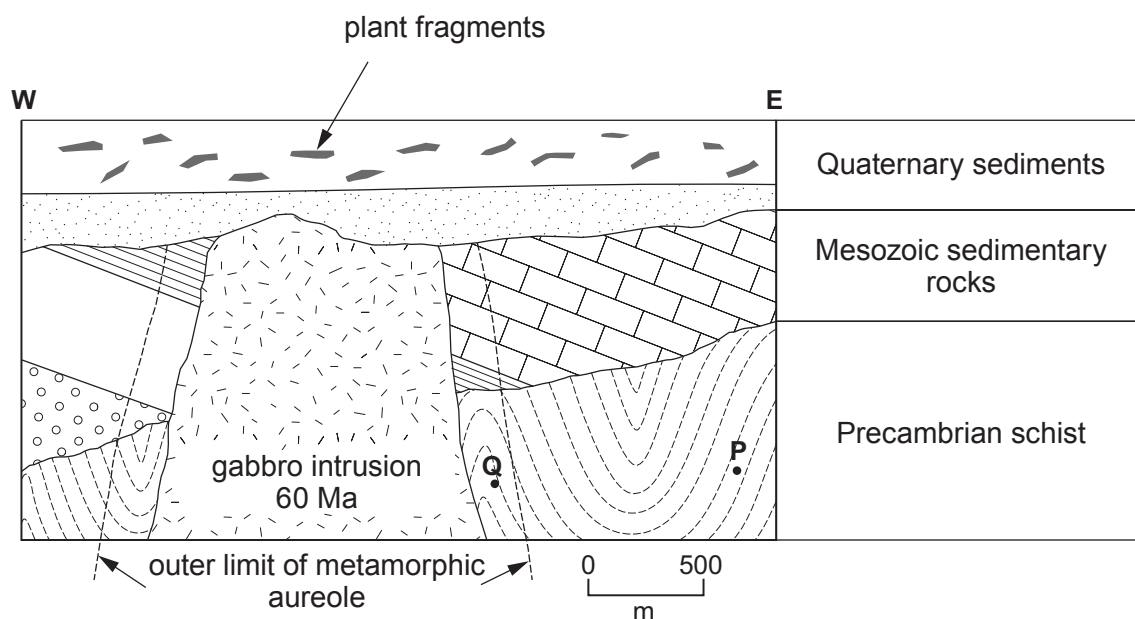


Figure 3

- (a) The age of geological materials can be determined using absolute or relative dating methods.

(i) State what is meant by *relative age*.

[1]

(ii) State the relative age of the gabbro intrusion shown in **Figure 3**. Explain your answer.

[3]

(iii) Identify the geological periods that make up the Mesozoic Era in **Figure 3** by ticking the appropriate boxes below. **Tick (✓) only three boxes.**

[2]

Tertiary	Ordovician	Cretaceous	Triassic	Silurian	Permian	Jurassic	Cambrian
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (b) The gabbro intrusion and the schist shown in **Figure 3** can be given absolute ages based on the decay of radioactive isotopes in some of the minerals they contain.

Table 3 shows information about radioactive isotopes and their relationship to the number of half-lives elapsed.

Number of half-lives elapsed	% parent isotope	% daughter isotope
0	100	0
1	50	50
2	•	•

Table 3

- (i) State what is meant by a *half-life*. [1]

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- (ii) Complete **Table 3** to show the percentage of parent and daughter isotopes after two half-lives. [1]

- (iii) The schist at locality **P** in **Figure 3** contains 12.5% radioactive ^{40}K parent atoms. The half-life of the radioactive ^{40}K is 1251 million years. Calculate the absolute age of the schist at locality **P**. Show your working. [2]

Absolute age of the schist million years

- (iv) With reference to **Figure 3** explain how and why the absolute age calculated for the schist might be different at locality **Q** compared to locality **P**. [3]

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- (c) The Quaternary sediments containing plant fragments in **Figure 3** have been dated using ^{14}C dating.
Evaluate the usefulness of this method in dating the other rock units in **Figure 3**. [3]

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4. **Figure 4a** shows the general relationships between major processes of the Earth's crust with respect to temperature, pressure and depth.

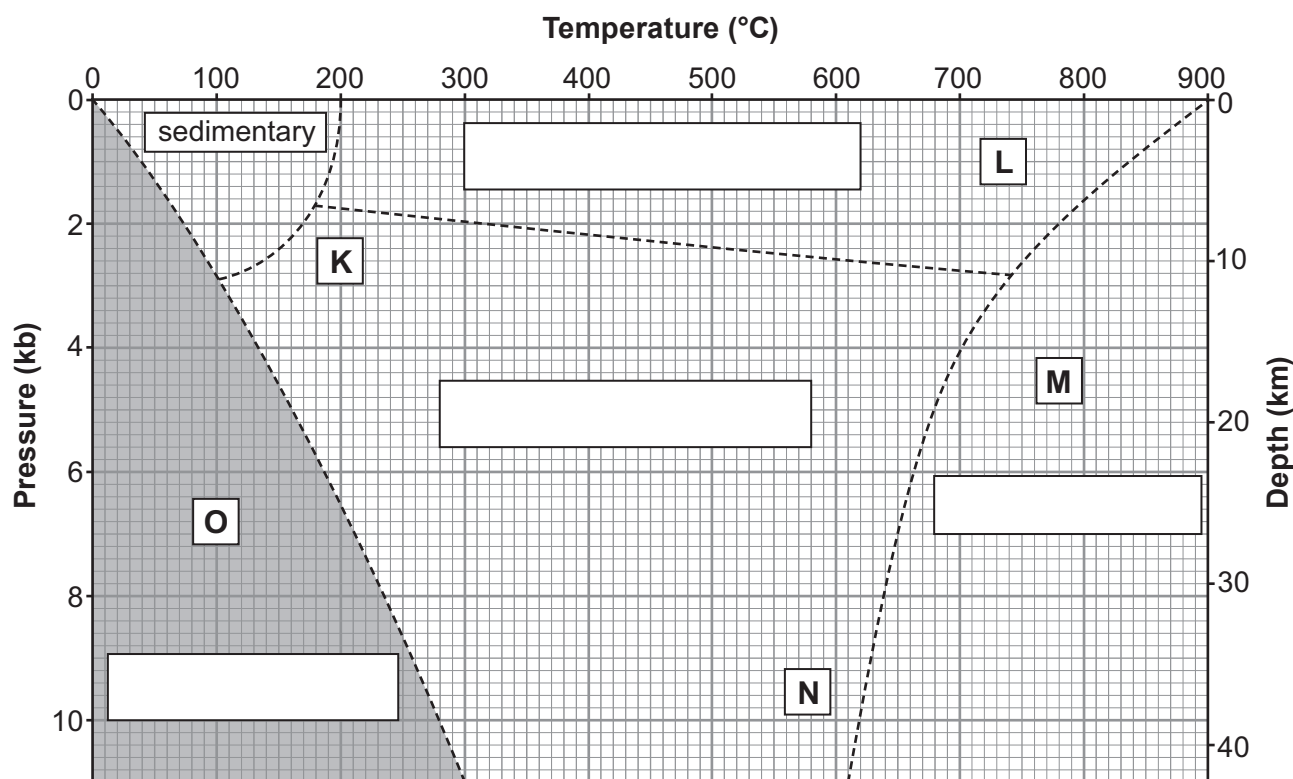


Figure 4a

Refer to **Figure 4a**.

- (a) (i) State the maximum depth and maximum temperature at which sedimentary processes can occur in the Earth's crust.

Maximum temperature °C Maximum depth km
[1]

- (ii) Complete **Figure 4a** by inserting the geological process labels below into the appropriate blank boxes. [2]

• igneous
• contact metamorphism
• regional metamorphism

- (iii) Suggest **two** factors that control the temperature at which metamorphic rocks will begin to melt and form igneous rocks. [2]

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Figure 4b and **Figure 4c** are photographs of two metamorphic rocks formed from the same type of sedimentary parent rock.

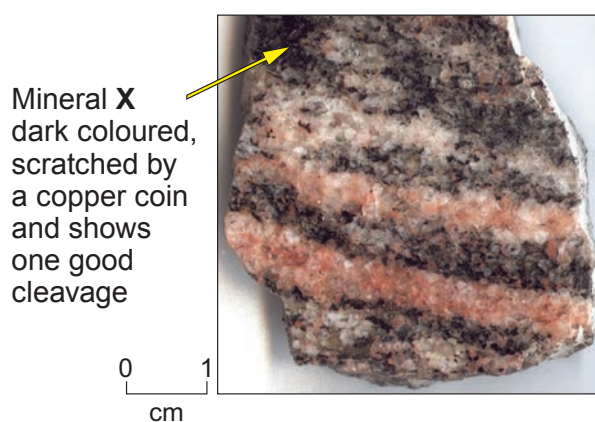


Figure 4b

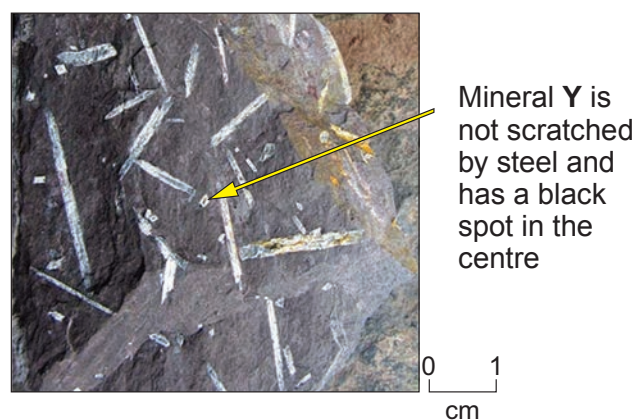


Figure 4c

- (b) (i) State the name of mineral **X** in **Figure 4b** and mineral **Y** in **Figure 4c**. You may wish to refer to the **Mineral Data Sheet**. [1]

Mineral **X** Mineral **Y**

- (ii) Suggest a name for the common parent rock that was metamorphosed to form the rocks shown in **Figure 4b** and **Figure 4c**. [1]

- (iii) Describe **two** differences in texture between the rocks shown in **Figure 4b** and **Figure 4c**. [2]

Difference 1

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Difference 2

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- (iv) Complete **Table 4** below to indicate which of the letters **K**, **L**, **M**, **N** or **O** on **Figure 4a** correspond to the formation of the rocks shown in **Figure 4b** and **Figure 4c**. [2]

Rock Type	Letter on Figure 4a
Figure 4b	
Figure 4c	

Table 4

- (v) Describe the plate tectonic setting under which the rock type shown in **Figure 4b** is likely to have been formed. Explain your answer. [3]

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