Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A Level

1211/01

S17-1211-01

GEOLOGY – GL1
Foundation Unit

MONDAY, 15 MAY 2017 – MORNING

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**16**	
2.	**13**	
3.	**16**	
4.	**15**	
Total	**60**	

1211
010001

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- the Mineral Data Sheet;
- 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. **Figures 1a** and **1b** give details of the plate tectonic setting of the Tonga Islands in the Pacific Ocean.

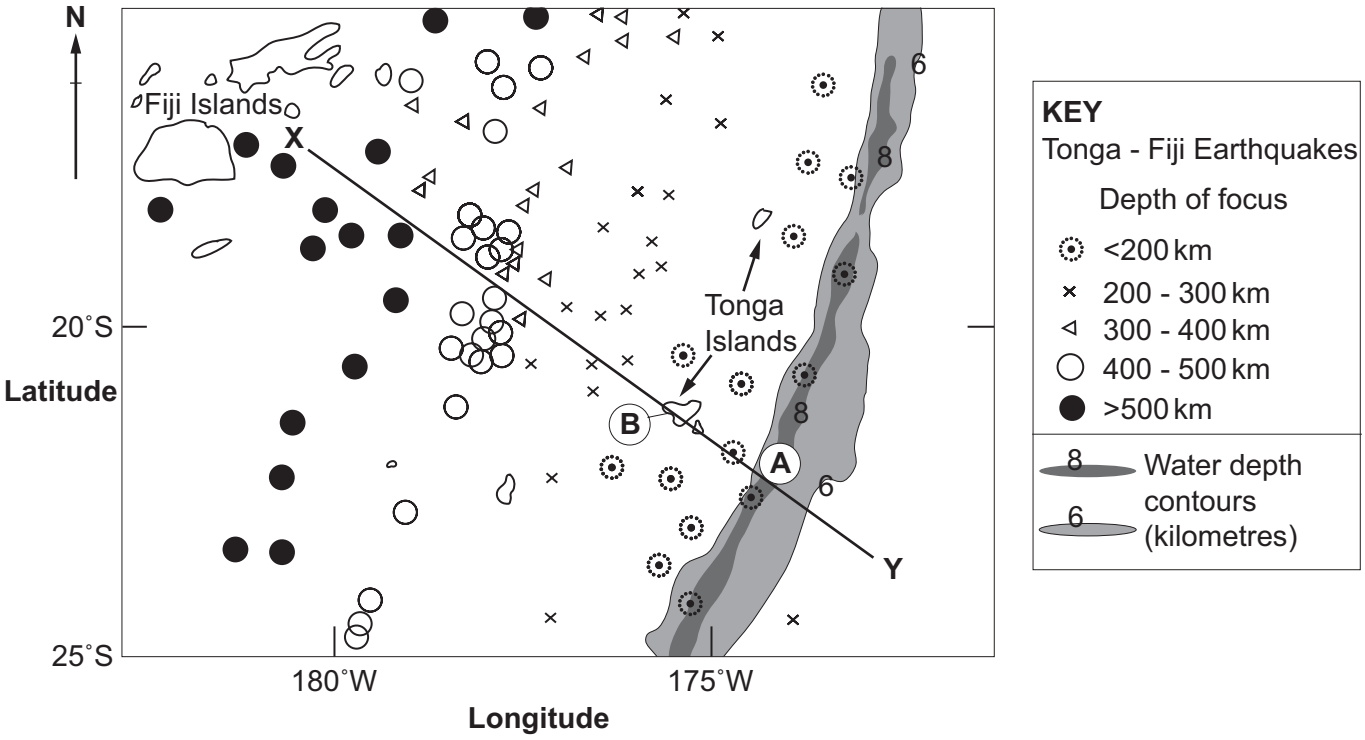

Figure 1a

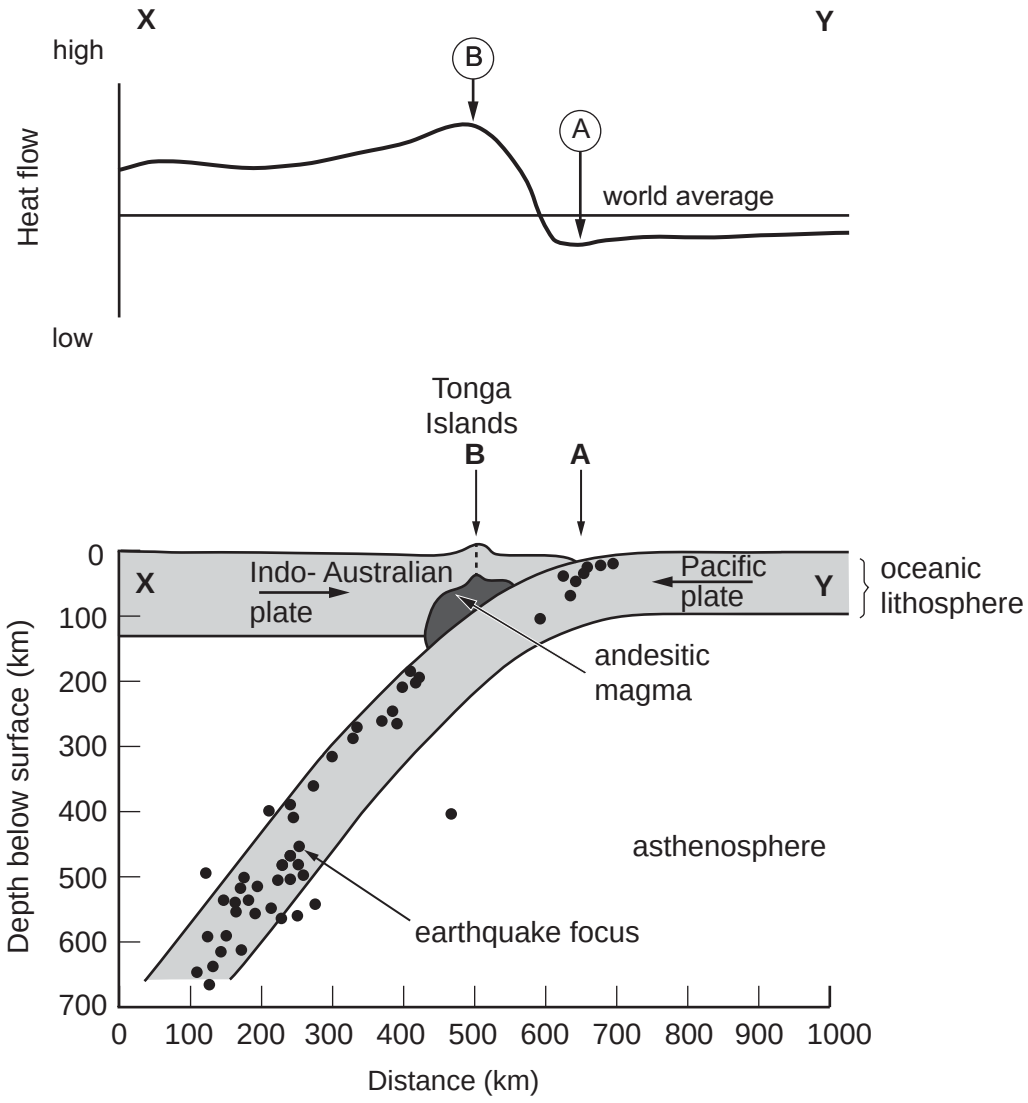

Figure 1b

Examiner only

(a) (i) Identify the features labelled **A** and **B** on **Figures 1a** and **1b**. Choose **two** from the following options. [2]

ocean ridge	ocean trench	volcanic island arc
fold mountains	transform fault	rift valley (graben)

A ..... **B** .....

(ii) Describe the pattern of earthquake foci shown in **Figure 1b**. [2]

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(iii) Explain why earthquakes occur at this plate tectonic setting. [2]

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(b) (i) With reference to **Figure 1b** describe and explain the difference in heat flow at **A** and **B**. [3]

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(ii) Suggest **one** possible cause of plate movement as indicated by the directional arrows shown on **Figure 1b**. [2]

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Examiner only

(iii) With reference to the variation in heatflow on **Figure 1b**, explain why the Pacific plate is subducted beneath the Indo-Australian plate. Note that both plates are composed of oceanic lithosphere. [2]

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(iv) Explain the origin of the andesitic magma beneath location **B** on **Figure 1b**. [3]

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Turn over.

Examiner only

2. **Figure 2a** shows the results of sieving a sample of dry loose sand, sand **A**. The sand has a modal grain size of 1.0 – 2.0 mm. A second sample of dry loose sand, sand **B** is much better sorted than sand **A** and has a modal grain size of $\frac{1}{4}$ to $\frac{1}{2}$ mm which comprises 60% of the sample.

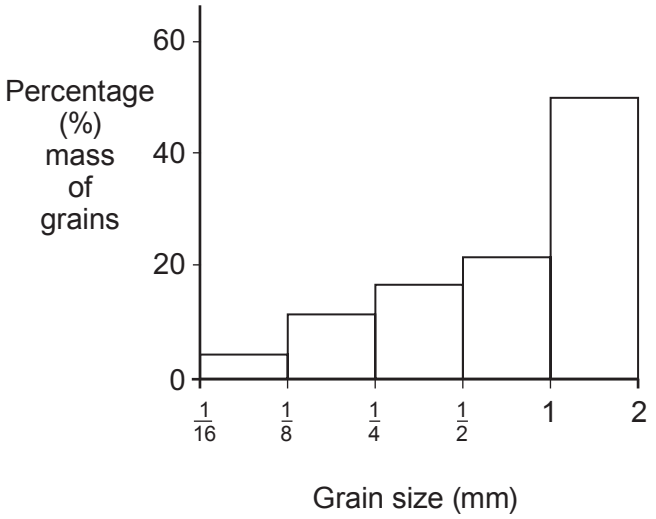

Figure 2a

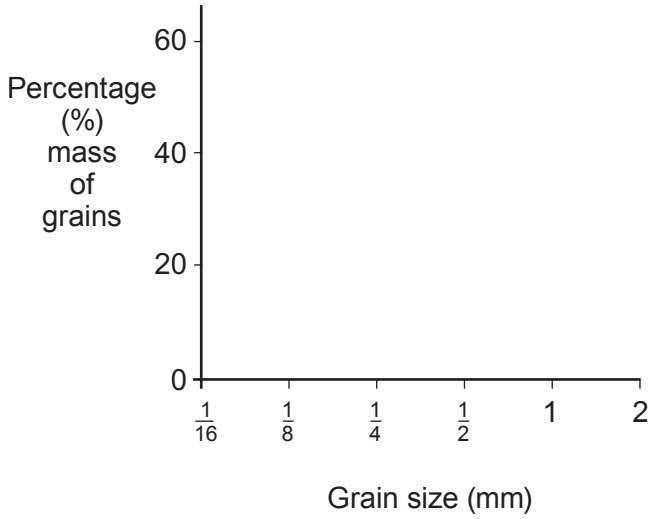

Figure 2b

(a) Complete **Figure 2b** to show the grain size distribution of sand **B**. [3]

(b) **Figure 2c** shows sand **A**.

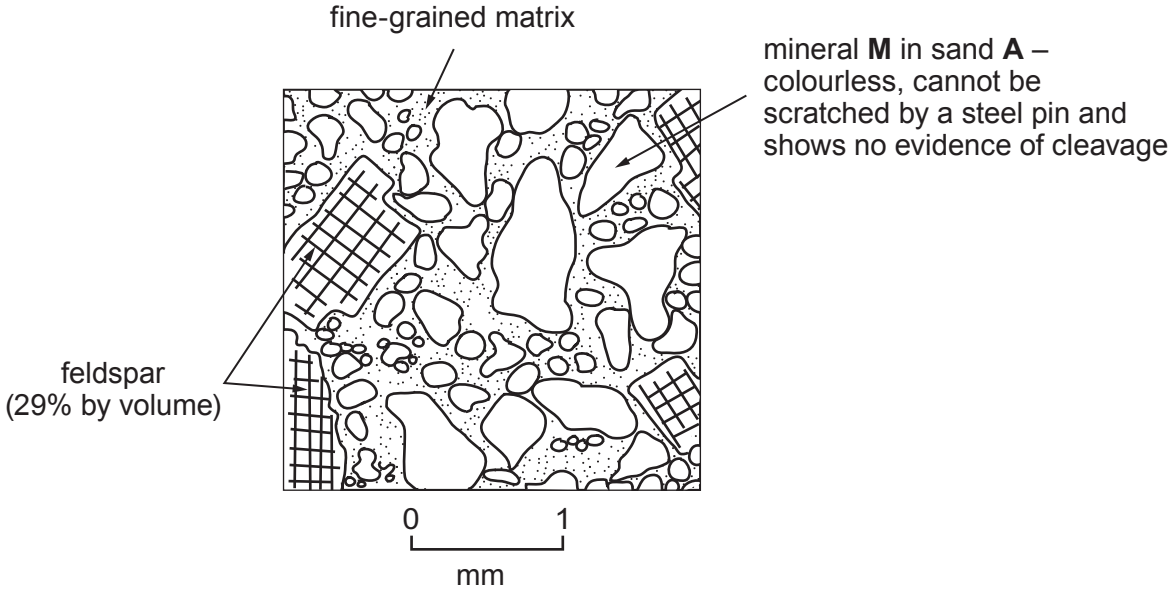

Figure 2c

Examiner only

(i) Using the Mineral Data Sheet, state the name of mineral **M**. [1]

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(ii) Describe the **texture** of sand **A** shown in **Figure 2c**. [3]

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(iii) Explain the difference in **shape** between the feldspar grains and the grains of mineral **M** in sand **A** shown in **Figure 2c**. You may wish to use the Mineral Data Sheet. [2]

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(iv) If sand **A** was deposited and consolidated into a sedimentary rock, what would be the most appropriate name for this rock? Tick (✓) only **one** box. [1]

granite	orthoquartzite	breccia	arkose	conglomerate
☐	☐	☐	☐	☐

(v) A student concluded that sand **A** was deposited in a **fluvial** environment. Evaluate the evidence from **Figure 2c** that supports this conclusion. [3]

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Turn over.

3. **Figure 3a** shows a geological map where a granite pluton has intruded into a sequence of sedimentary rocks. **Figure 3b** shows fossil **S** from the shale and **Figure 3c** shows fossil **L** from the limestone.

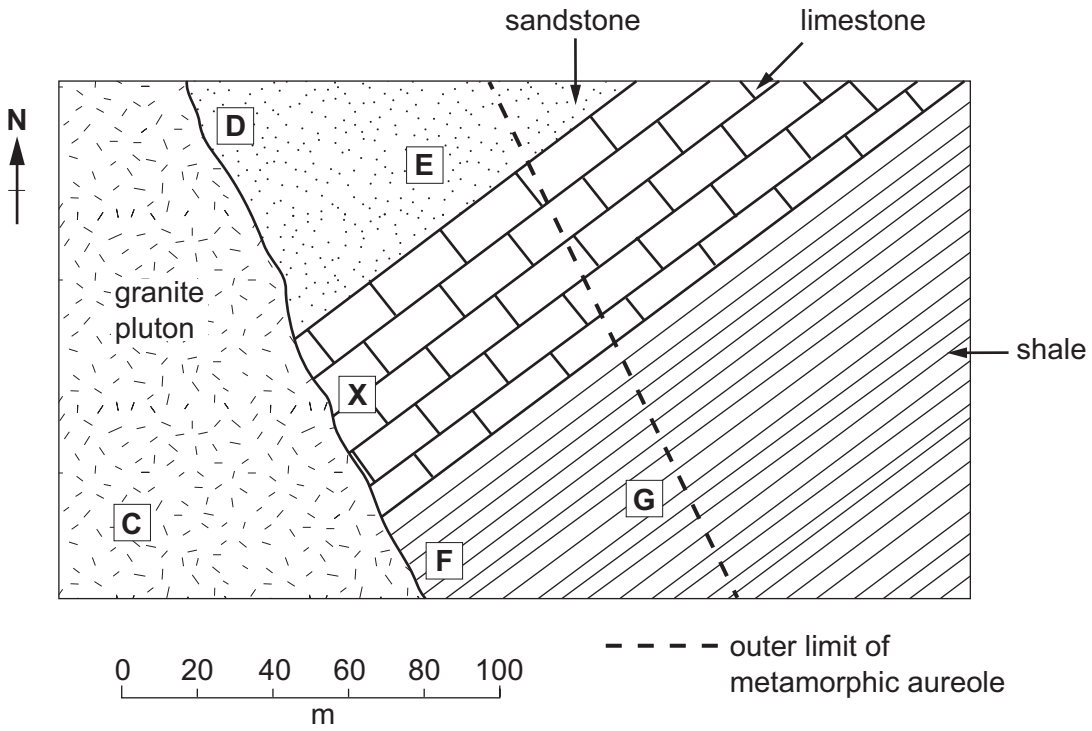

Figure 3a

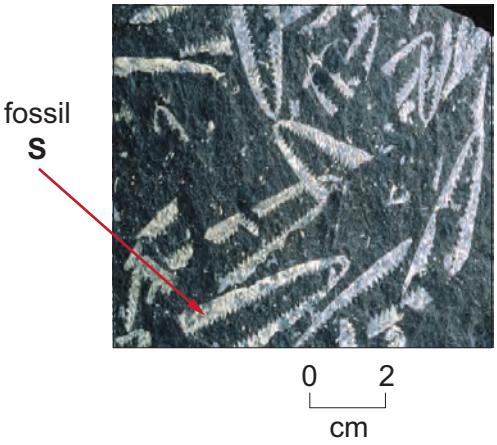

Figure 3b

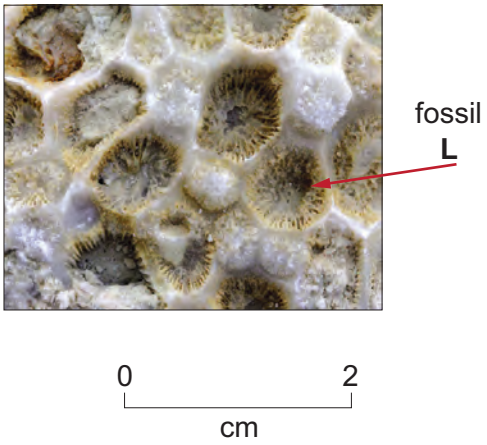

Figure 3c

Examiner only

(a) (i) Name the fossil groups to which fossil **S** and fossil **L** belong. [2]

Fossil **S** ..... Fossil **L** .....

(ii) With reference to **Figure 3c** describe the depositional environment of the limestone in **Figure 3a**. Give reasons for your answer. [3]

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(iii) Explain why fossil **S** is more useful for the relative dating of rocks than fossil **L**. [3]

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(b) Refer to **Figure 3a**.

(i) Define the term metamorphic aureole. [2]

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(ii) State at which locality **C**, **D**, **E**, **F** or **G** in **Figure 3a** spotted rock is most likely to be found. Give reasons for your answer. [3]

Locality ☐

Reasons .....

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Examiner only

(c) Draw in **Figure 3d** the texture of the metamorphic rock located at locality **X** in **Figure 3a**. The **mean** crystal size of this rock is 1.5 mm. [3]

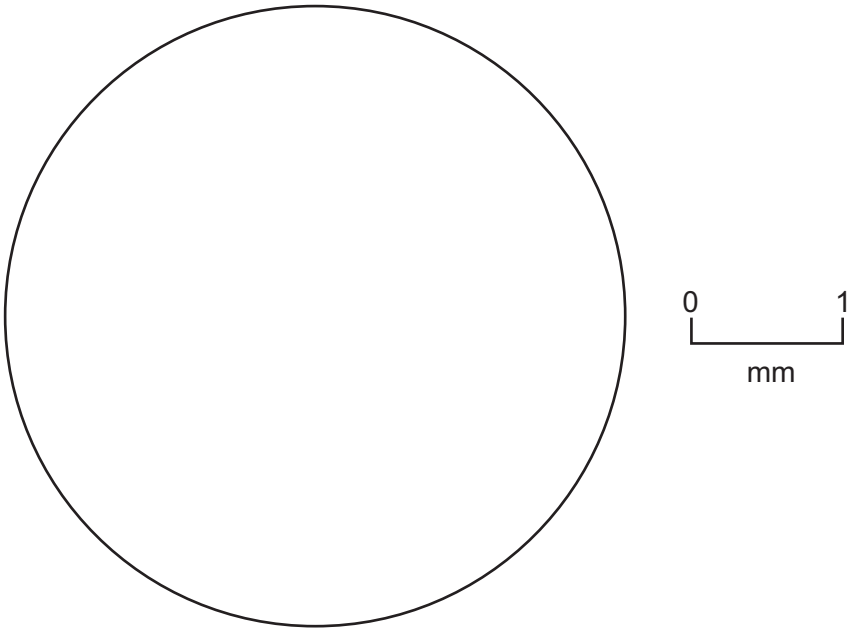

Figure 3d

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Examiner only

4. **Figure 4** is a **cross-section** showing the true dip of a sequence of sedimentary rocks exposed in a roadside cutting.

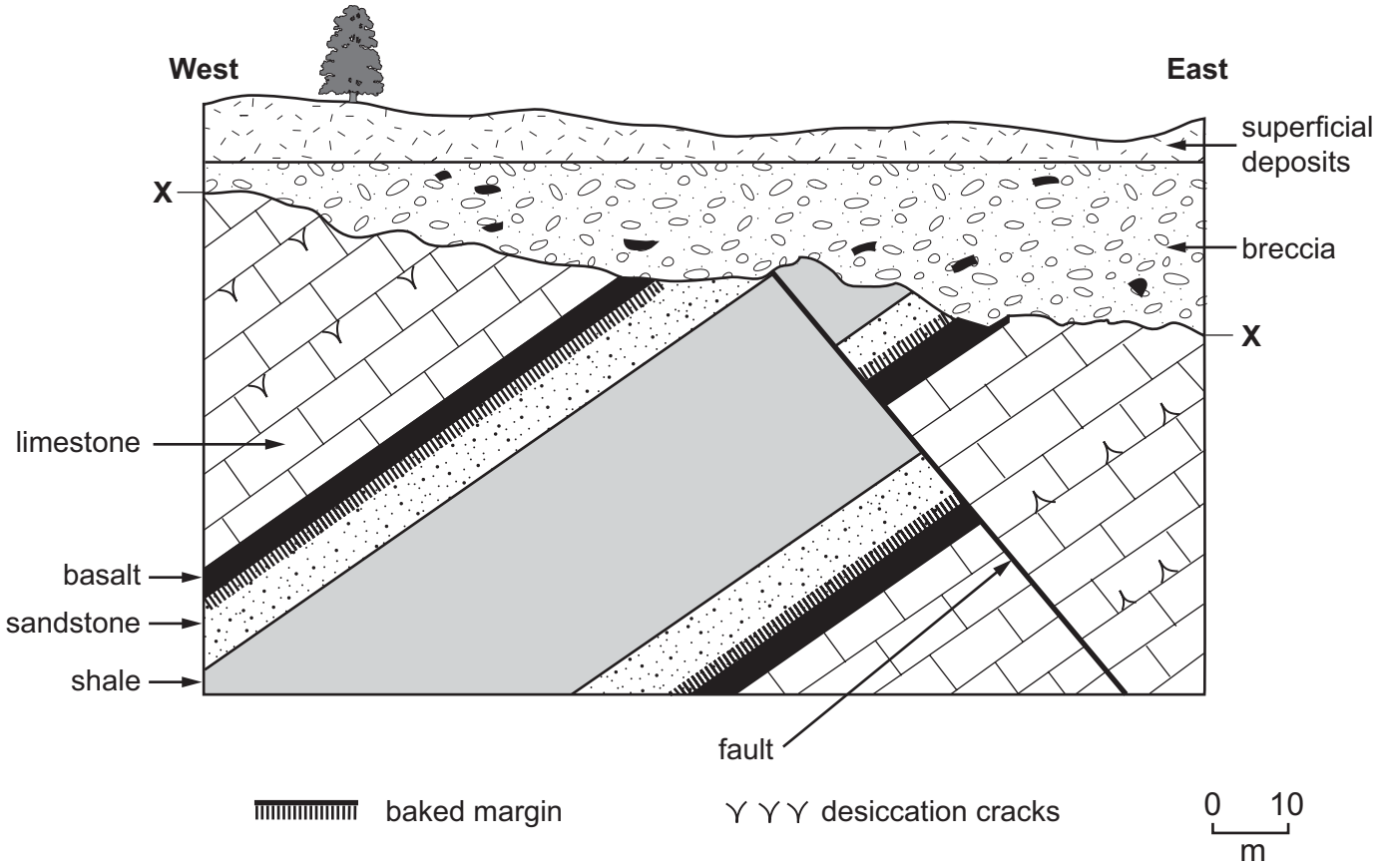

Figure 4

(a) (i) State the angle and direction of dip of the sedimentary rocks below the boundary labelled **X–X** in **Figure 4**. [2]

Angle of dip ..... ° Direction of dip .....

(ii) State the type of geological boundary labelled **X–X** in **Figure 4**. [1]
Tick (✓) only **one** box.

bedding plane	joint	unconformity	fault	baked margin
☐	☐	☐	☐	☐

(iii) Indicate with an arrow labelled **U** (**U** ⟶) on **Figure 4 one** bed which has been overturned. [1]

(iv) State **two** pieces of evidence from **Figure 4** that confirm that some of the beds are overturned. [2]

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Turn over.

Examiner only

(b) There is a major fold structure in the rocks below boundary **X–X** in **Figure 4**.

(i) Draw the position of the fold axis on **Figure 4**. [1]

(ii) Select the **three** boxes which best describe the main characteristics of the fold shown in **Figure 4**. [3]

Type of fold Tick (✓) only **one** box

anticline	☐	syncline	☐	insufficient information in **Figure 4** to decide	☐

Strike of axial plane trace Tick (✓) only **one** box

North-South	☐	East-West	☐	Northwest-Southeast	☐

Fold symmetry Tick (✓) only **one** box

asymmetrical	☐	symmetrical	☐	insufficient information on **Figure 4** to decide	☐

(c) State the type of igneous body formed by the basalt shown in **Figure 4**. Give a reason for your answer. [2]

Type of igneous body .....

Reason .....

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Examiner only

(d) A student concluded that the fault in **Figure 4** is older than the breccia and has been formed by compressional forces resulting in a normal fault. Evaluate these conclusions. [3]

Fault is older than the breccia .....

.....

Fault formed by compressional forces .....

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Is a normal fault .....

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