



GCE AS/A Level

1211/01

GEOLOGY – GL1

FOUNDATION UNIT

MONDAY, 15 MAY 2017 – MORNING

1 hour plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 2 _____

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

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

**the Mineral Data Sheet;
a protractor.**

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

Write your name, centre number and candidate number in the spaces provided on the front cover.

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

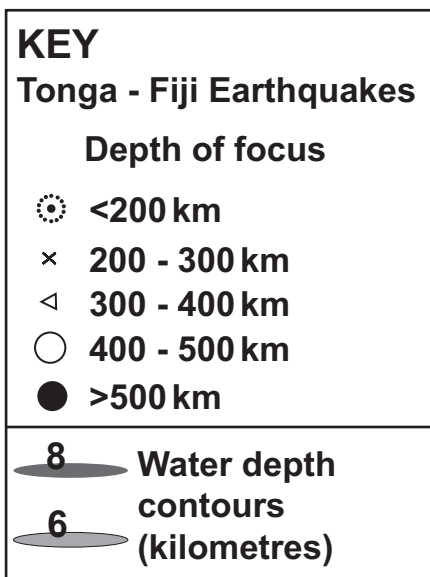
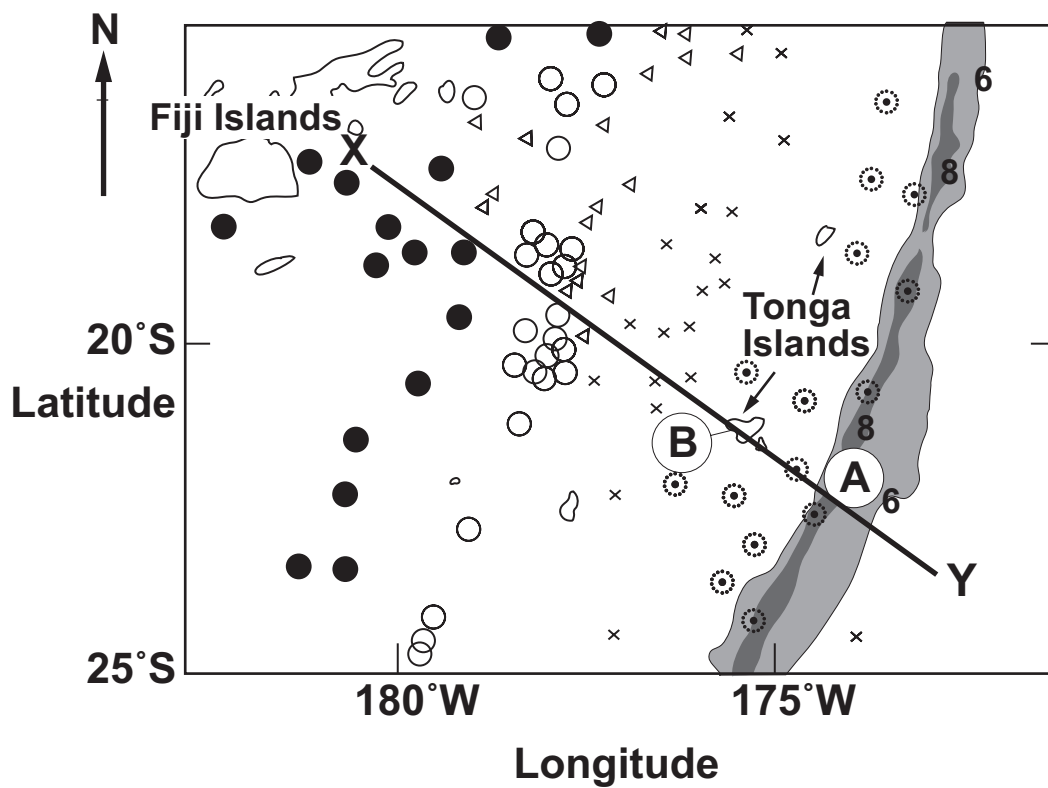
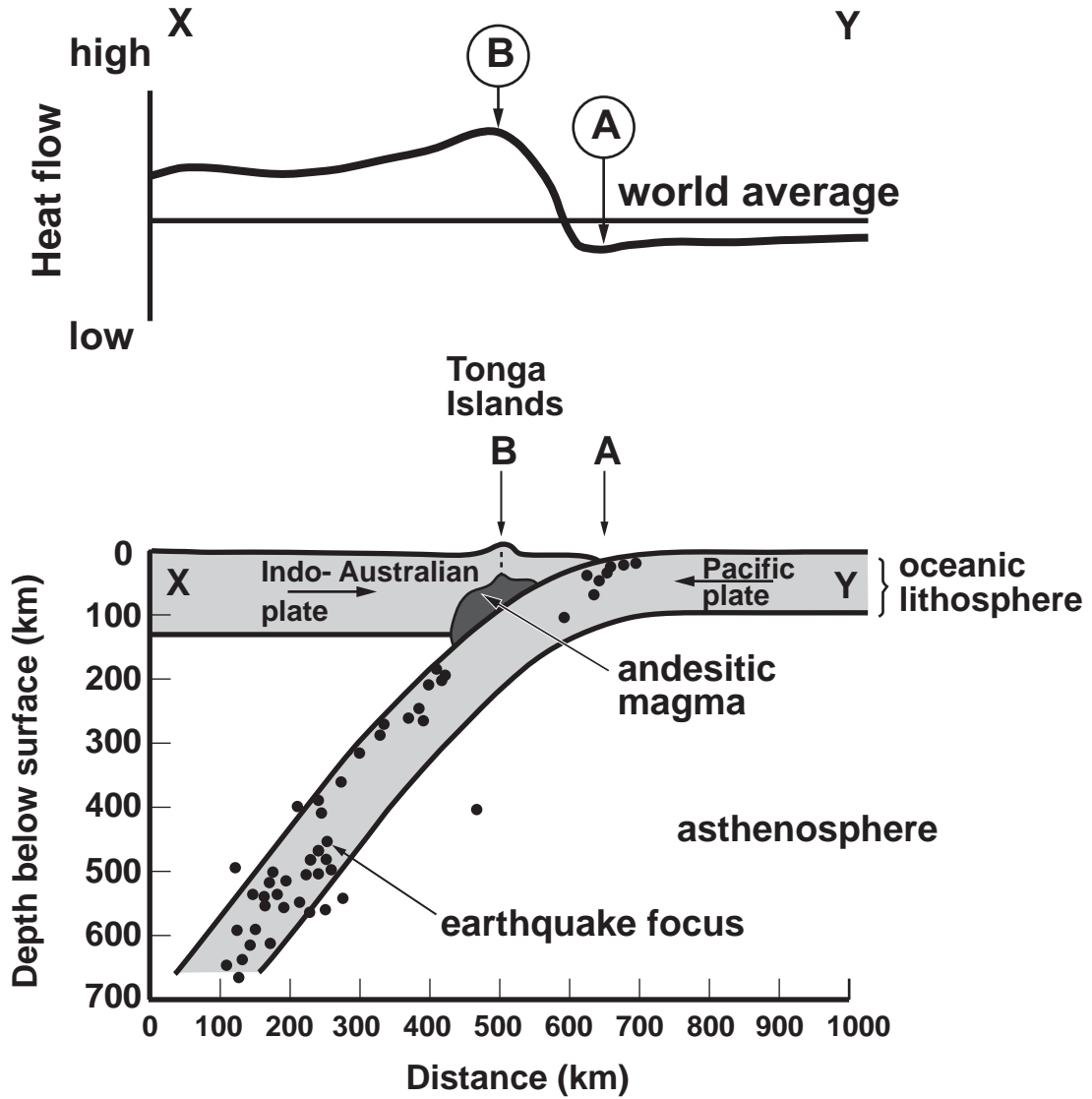


FIGURE 1b



1(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 _____

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

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

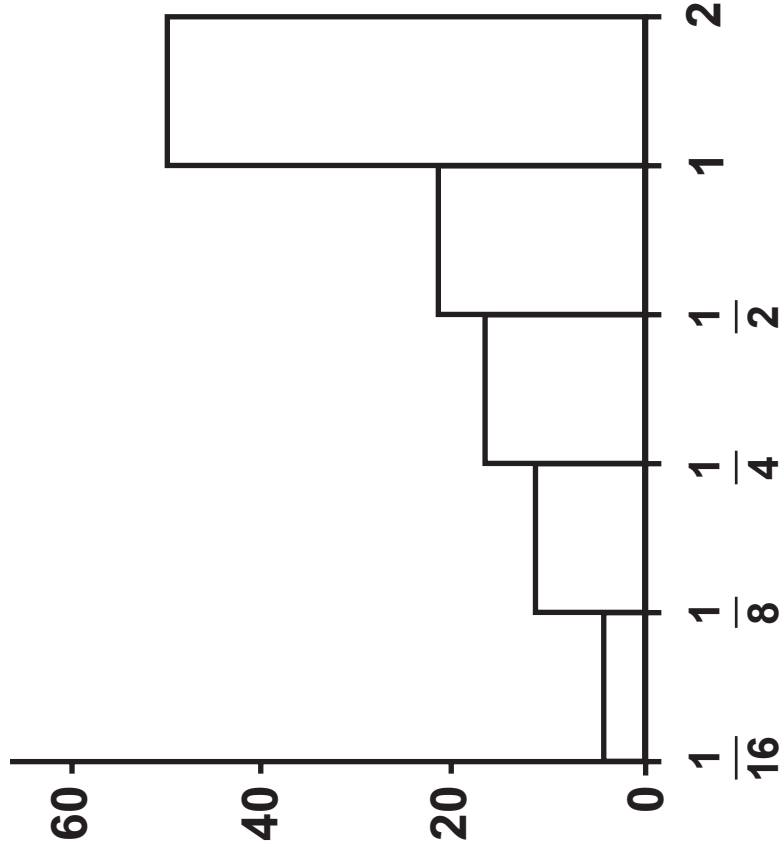
1(b) (iii) With reference to the variation in heatflow on FIGURE 1b, explain why the Pacific plate is subducted beneath the Indo-Australian plate. Note that both plates are composed of oceanic lithosphere. [2]

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

16

FIGURE 2a

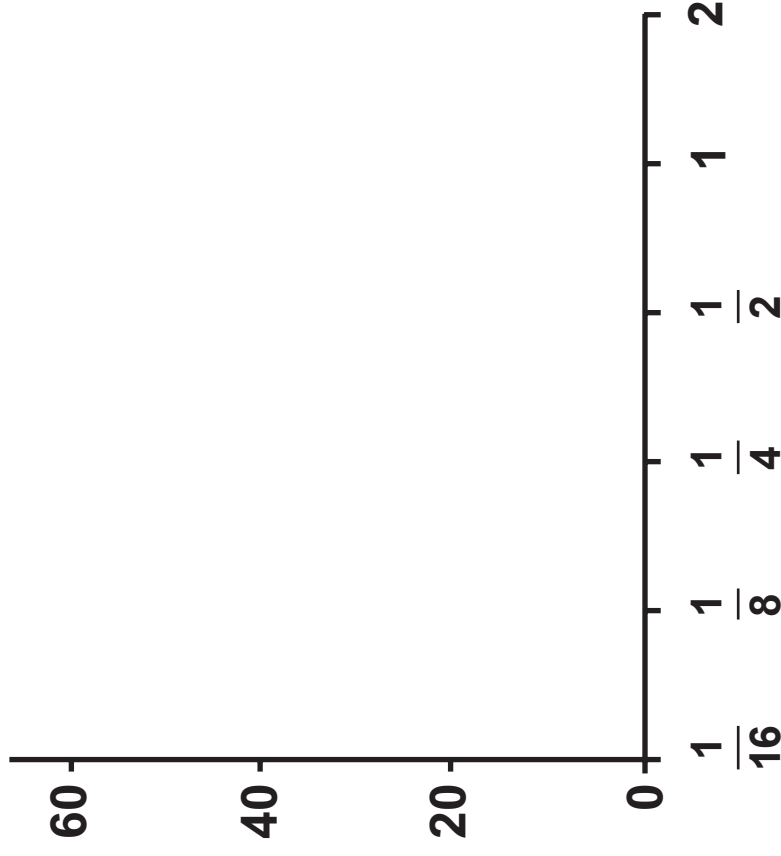
**Percentage (%)
mass of grains**



Grain size (mm)

FIGURE 2b

**Percentage (%)
mass of grains**



Grain size (mm)

2. **FIGURE 2a** opposite 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.

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

2(b) FIGURE 2c shows sand A.

FIGURE 2c

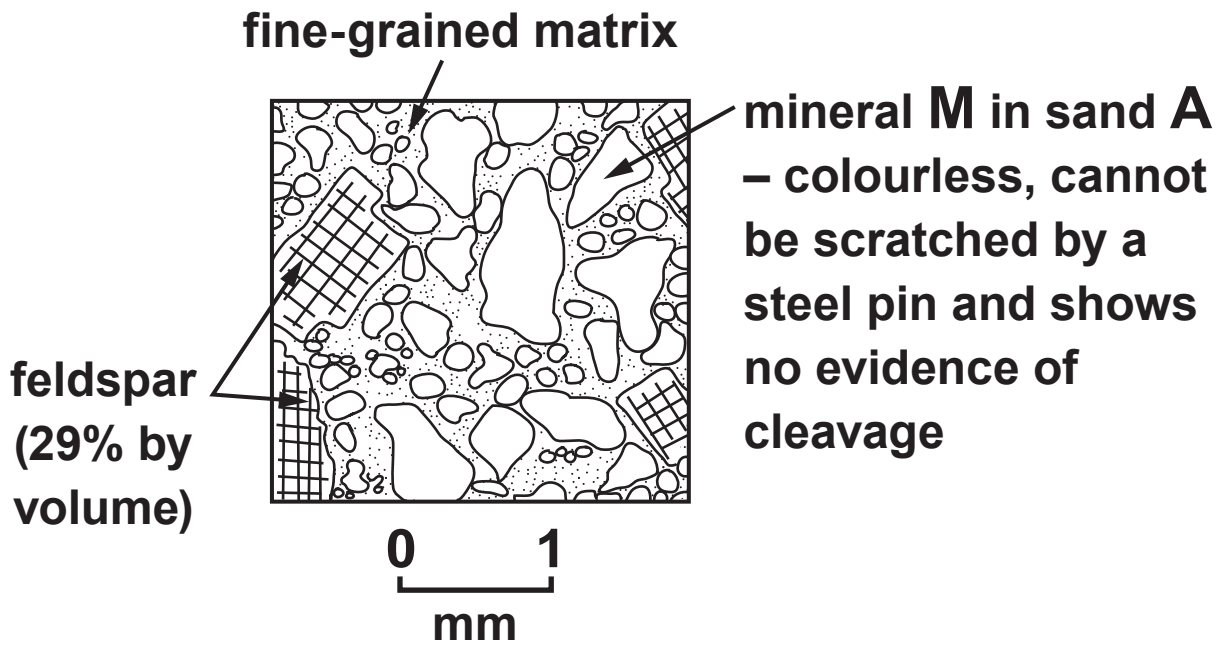


FIGURE 3a

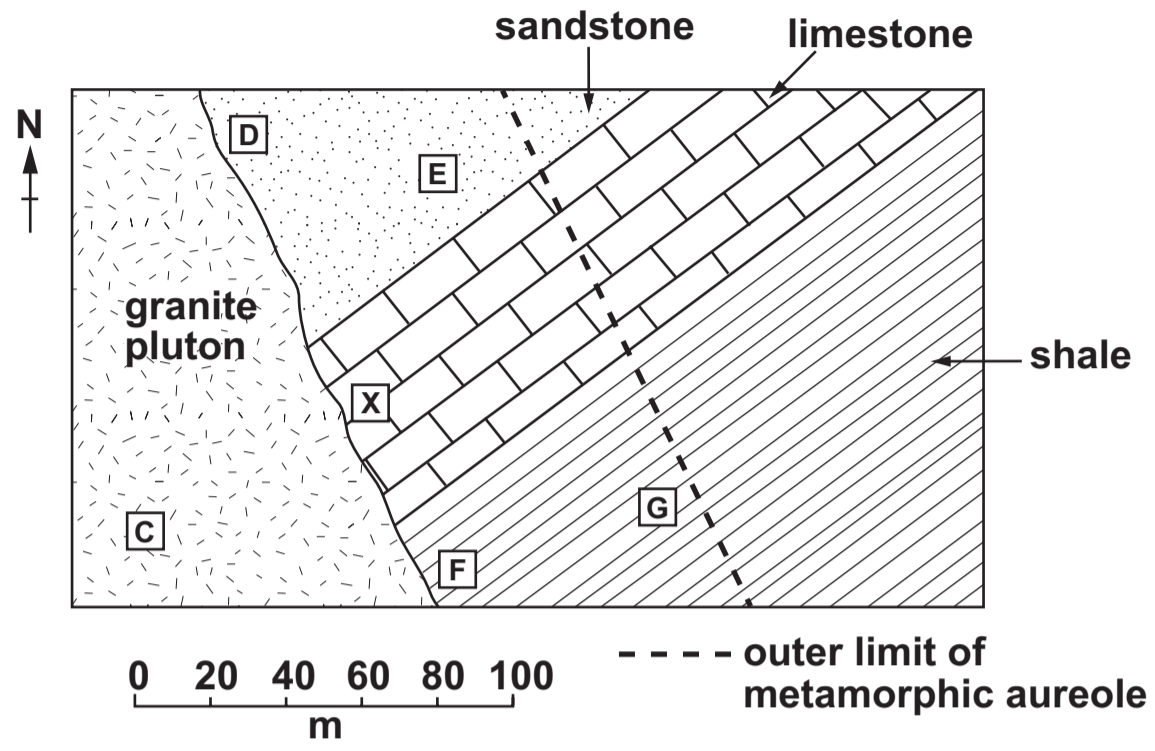


FIGURE 3b

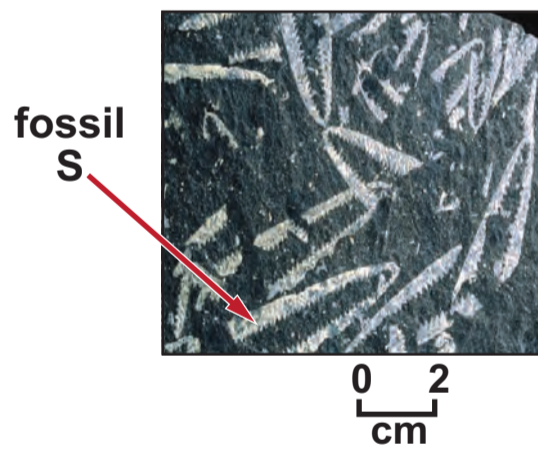
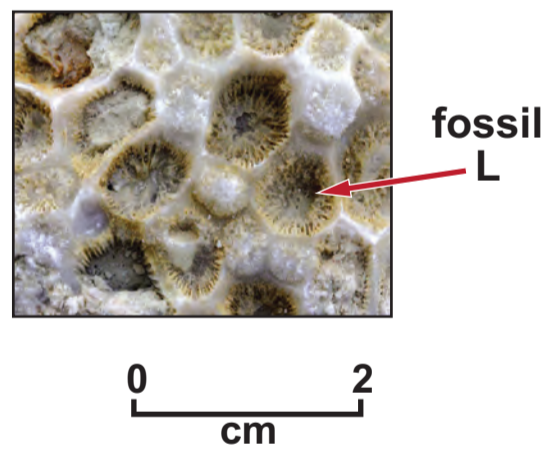


FIGURE 3c



2(b) (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]

2(b) (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

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

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

(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]

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

3(b) Refer to FIGURE 3a.

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

(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 _____

- 3(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

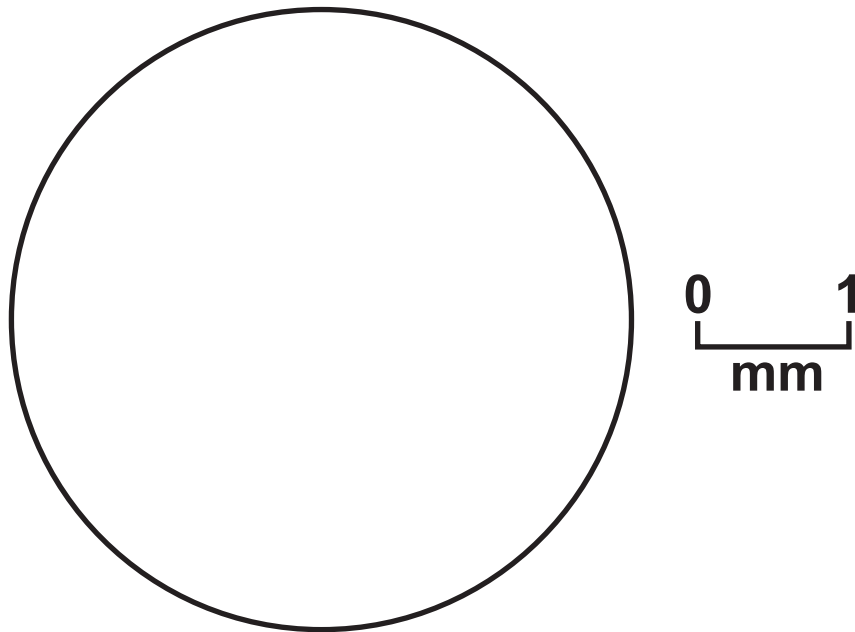
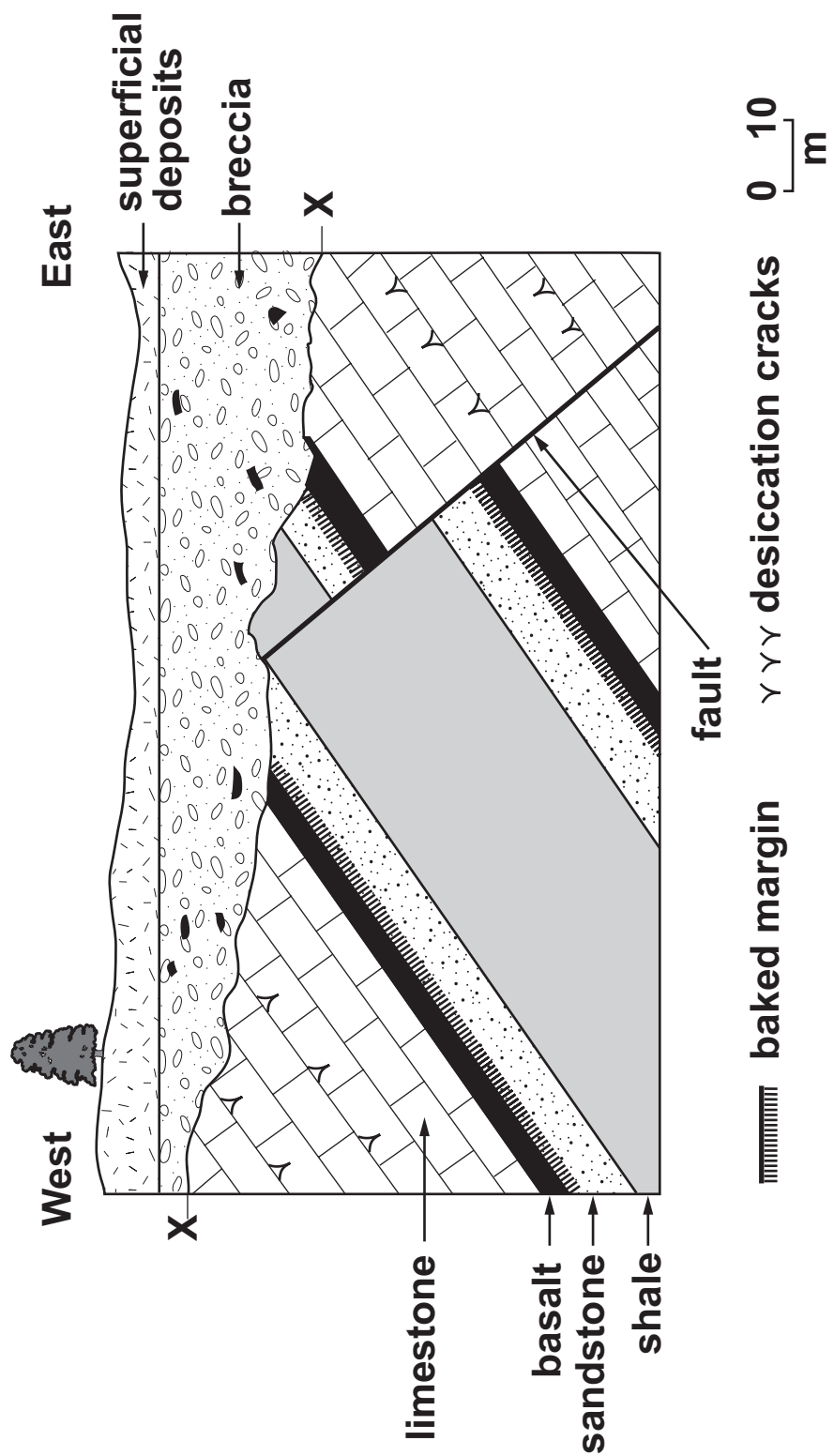


FIGURE 4



4. **FIGURE 4** opposite is a **CROSS-SECTION** showing the true dip of a sequence of sedimentary rocks exposed in a roadside cutting.

- (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

4(a) (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]

TYPE OF FOLD

anticline

syncline

Tick (✓) only ONE box

insufficient
information in
FIGURE 4 to decide

**STRIKE OF AXIAL
PLANE TRACE**

North-South

East-West

Tick (✓) only ONE box

Northwest-
Southeast

FOLD SYMMETRY

asymmetrical

symmetrical

Tick (✓) only ONE box

insufficient
information on
FIGURE 4 to decide

4(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** opposite page 21. [1]

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

(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 _____

4(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

4(d) Is a normal fault

15

END OF PAPER