

Candidate Name	Centre Number	Candidate Number
		2



GCE AS/A level

1211/01

New AS

GEOLOGY - GL1

Foundation Unit

P.M. THURSDAY, 8 January 2009

1 hour

	Examiner only
Question 1	
Question 2	
Question 3	
Question 4	
Total	60

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a copy of the **Mineral Data Sheet**.

INSTRUCTIONS TO CANDIDATES

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.

GL1. FOUNDATION GEOLOGY

Answer all questions.

1. **Figure 1a** shows a fossil bivalve and a graptolite. **Figure 1b** shows a sedimentary structure preserved on a bedding plane of a sandstone.

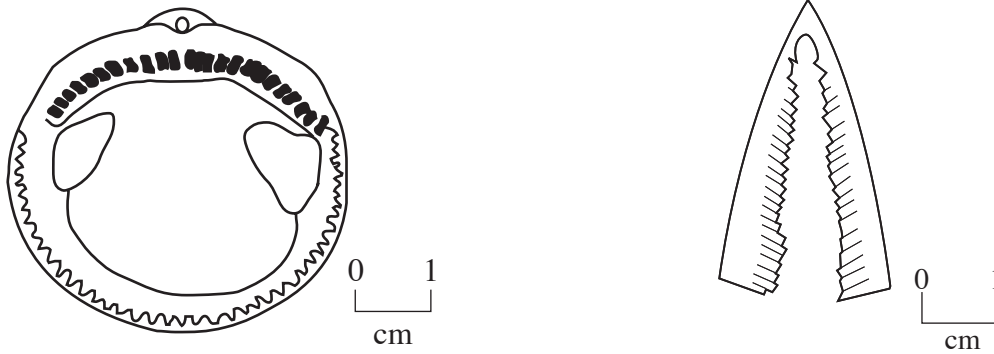


Figure 1a

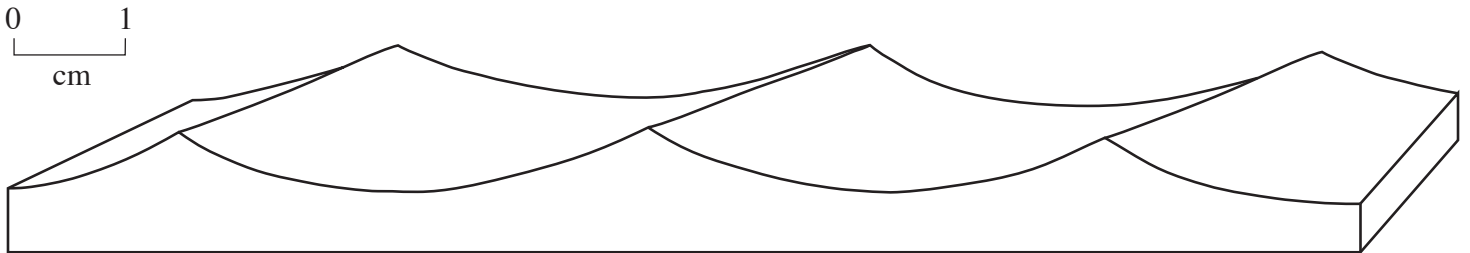


Figure 1b

- (a) Label **Figure 1a**, to show the position of [2]

- a pallial line,
- teeth.

- (b) Refer to **Figure 1b**.

- (i) Name the sedimentary structure shown in **Figure 1b**. [1]

.....

- (ii) Describe the most likely process and environment in which the sedimentary structure shown in **Figure 1b** formed. [3]

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- (iii) Explain why the bivalve rather than the graptolite is more likely to have been preserved in the sandstone. Give reasons for your answer. [3]

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Figure 1c shows sedimentary features and fossils preserved on a bedding plane.

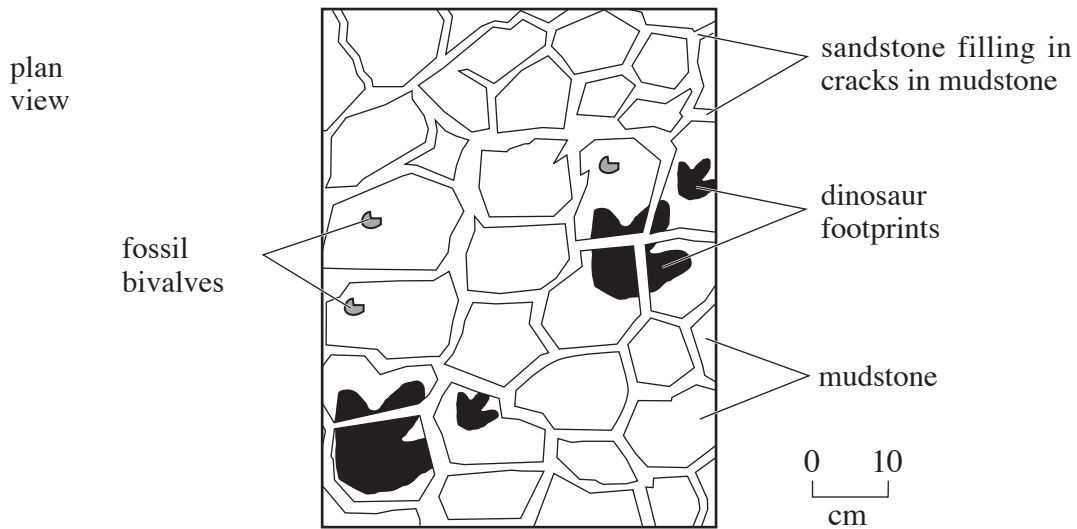


Figure 1c

- (c) Using the evidence shown in **Figure 1c**, evaluate the statement that “*the sedimentary rocks shown in Figure 1c were deposited in a deep-water environment*”. [6]

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[Total 15 marks]

2. **Figure 2a** is a graph showing the travel time curves for S-waves and surface waves. **Figure 2b** shows the path taken by S-waves to seismic recorders **A** and **B**. The distances from the epicentre to seismic recorders **A** and **B** are shown in **Figure 2a**. **Figure 2c** shows the seismogram of the same earthquake received at a third seismic recorder, **C** (not shown in **Figure 2b**). **Figure 2d** shows the seismogram of the same earthquake received at seismic recorder **D** shown in **Figure 2b**.

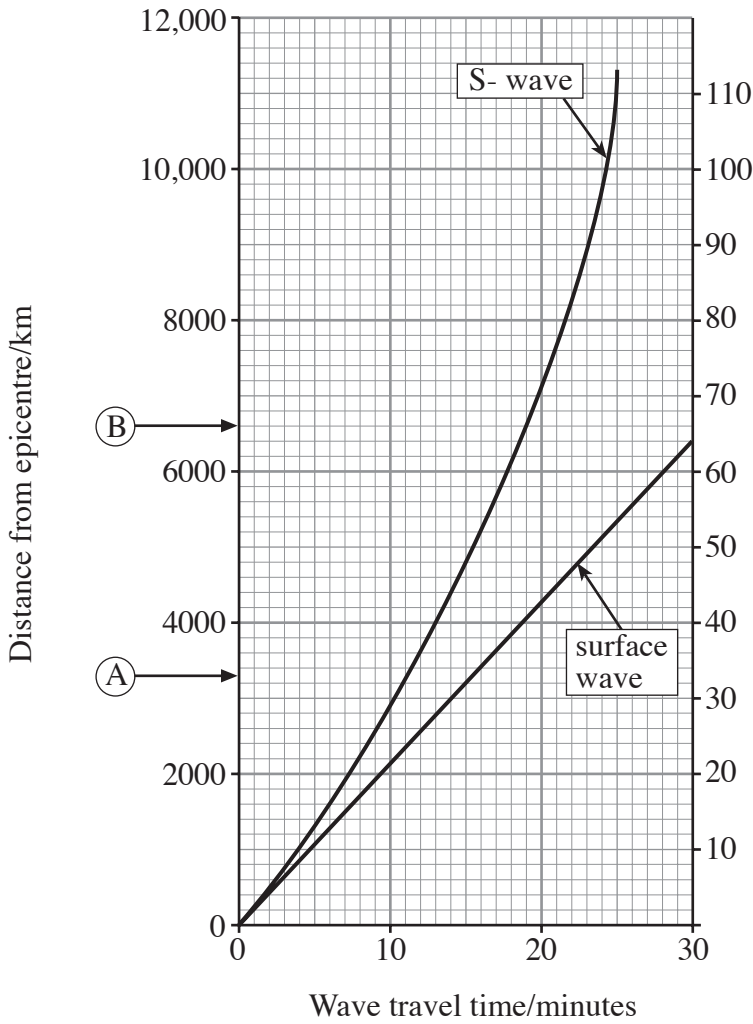


Figure 2a

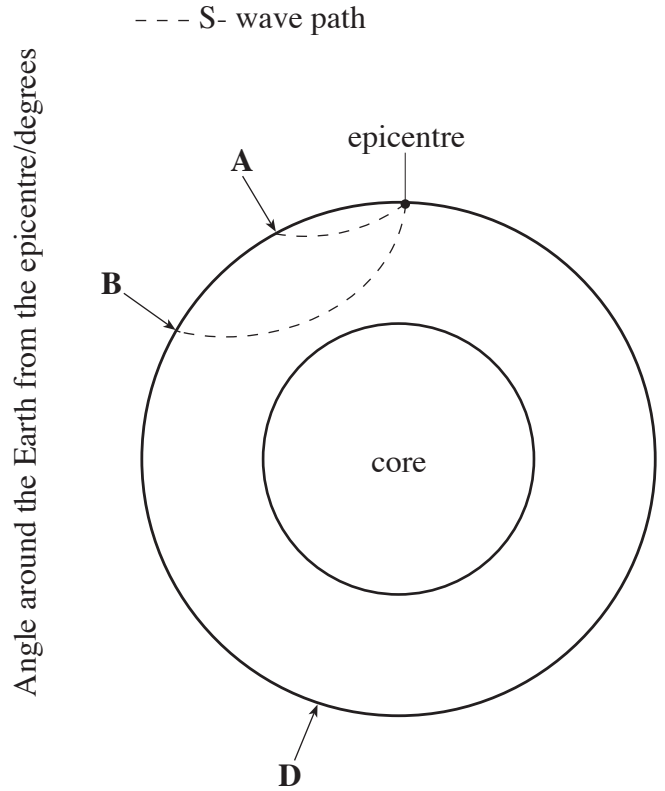


Figure 2b

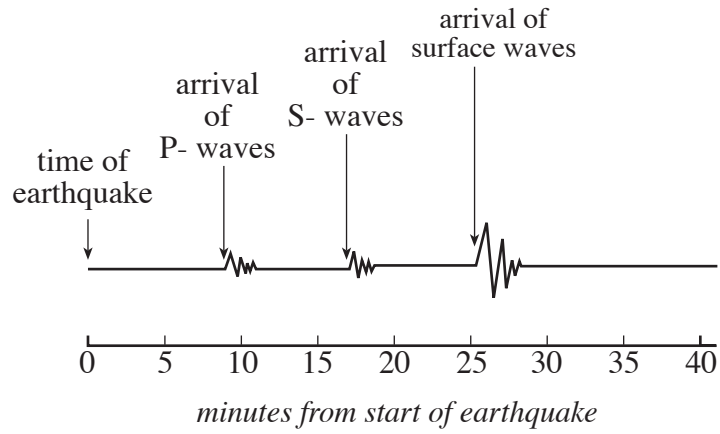


Figure 2c

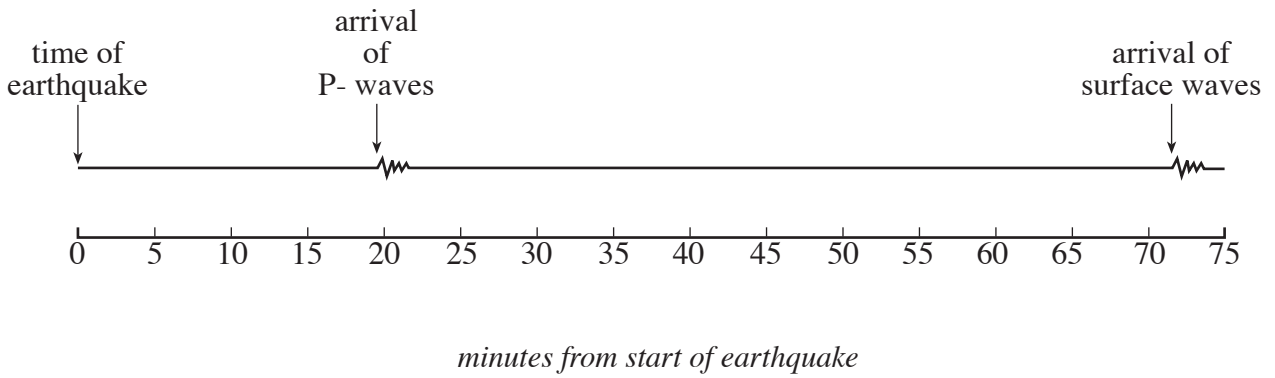


Figure 2d

- (a) (i) With reference to **Figure 2a**, complete **Table 2** by:
- recording the arrival time of the **surface** wave at seismic recorder **A**;
 - calculating the velocity of the **surface** waves between the epicentre and seismic recorder **A**. Show your working.

[3]

Distance to seismic recorder A from the epicentre/km	Arrival time of surface waves at seismic recorder A /minutes	Velocity of the surface waves/km min ⁻¹
3300		

Table 2

- (ii) With reference to **Figure 2b** and your knowledge, explain why the S-waves arriving at seismic recorder **B** have a higher mean velocity than the S-waves arriving at seismic recorder **A**.

[2]

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- (b) (i) Using **Figure 2a**, and the arrival time for the S-wave shown in **Figure 2c**, determine the distance of seismic recorder **C** from the epicentre. Show your working.

[2]

Distance km

- (ii) With reference to the seismogram shown in **Figure 2c**, draw in **Figure 2a** a travel time curve for **P-waves**.

[3]

(c) Seismic recorder **D**, shown on **Figure 2b**, is 160° from the epicentre.

(i) Describe **three** differences between the seismogram for seismic recorder **C** (**Figure 2c**) and the seismogram for seismic recorder **D** (**Figure 2d**). [3]

Difference 1

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Difference 2

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Difference 3

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(ii) Using your knowledge, explain the differences between the two seismograms, **Figure 2c** and **Figure 2d**. [4]

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[Total 17 marks]

3. Figure 3a is a geological map.

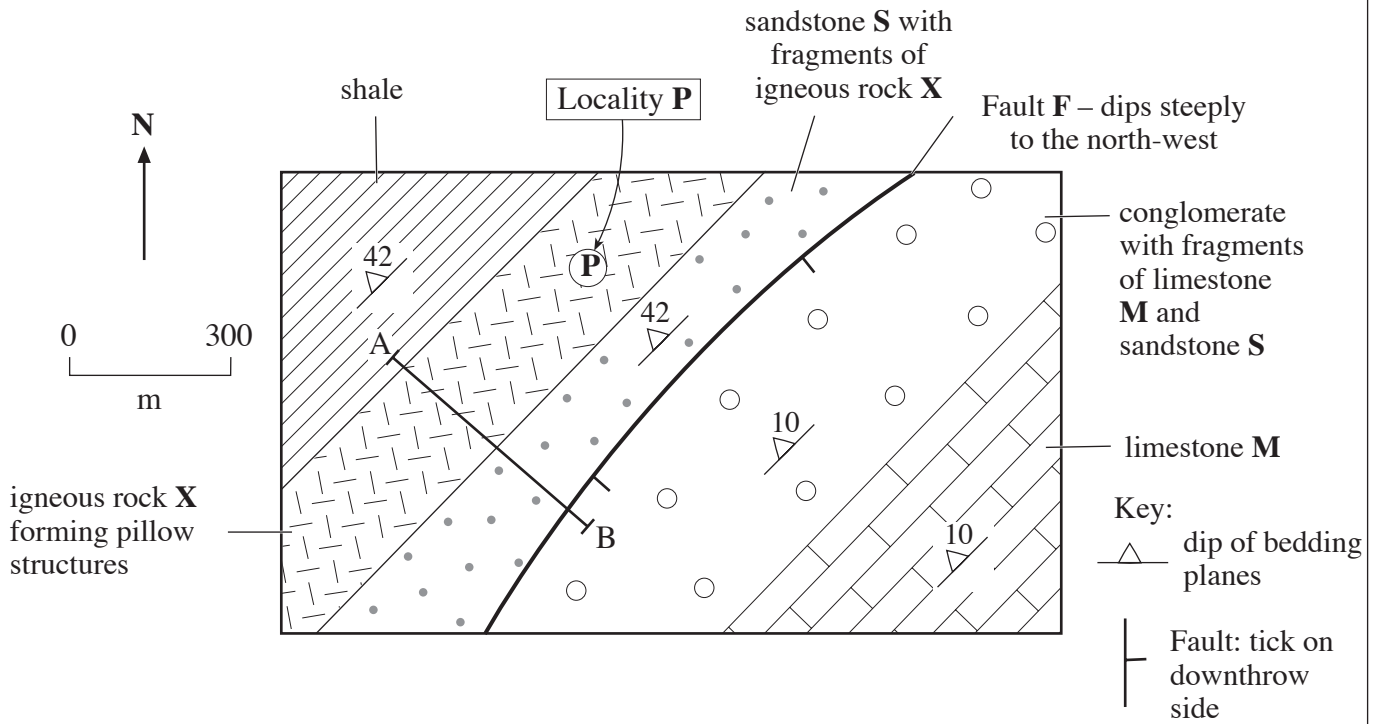


Figure 3a

(a) Refer to Figure 3a.

- (i) **Fault F dips steeply to the northwest.** Select, from the list below, the type of fault which best represents that shown in Figure 3a. Give a reason for your answer. [2]

Normal Reverse Thrust Strike-Slip

Type of fault

Reason

.....

.....

- (ii) State the name of the youngest rock on Figure 3a. Give reasons for your answer. [3]

Youngest rock

Reasons

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Figure 3b is a diagram showing a cross-section of pillow structures seen in a vertical face at locality P on Figure 3a. Figure 3c is a cross-sectional model of the geology along the line A-B on Figure 3a.

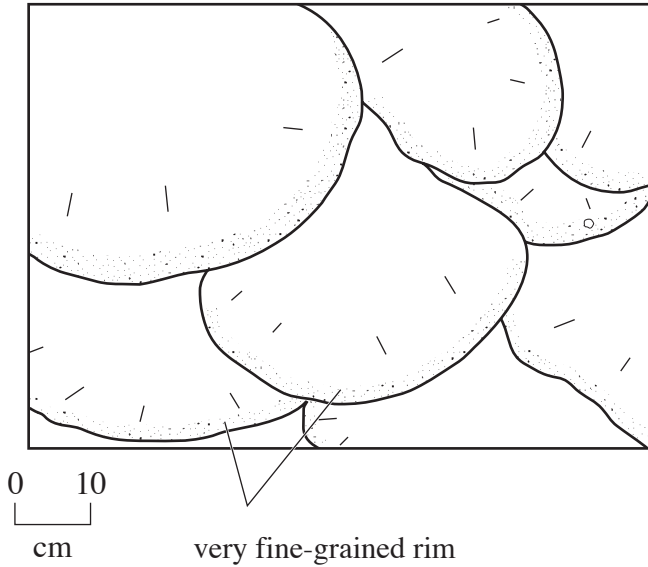


Figure 3b

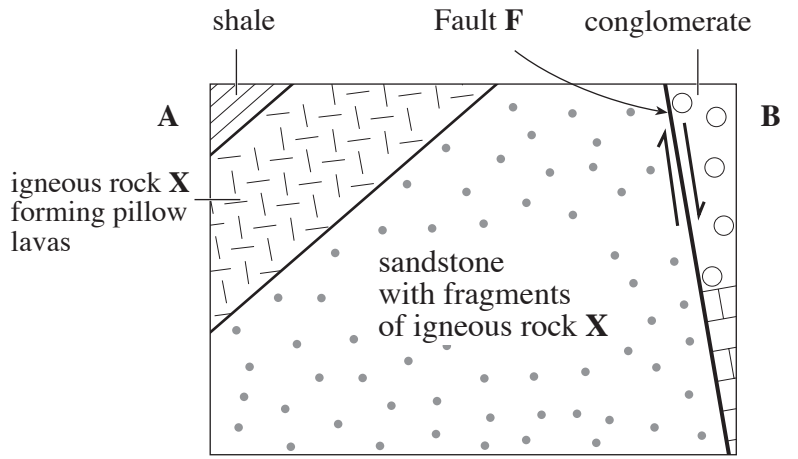


Figure 3c

(b) Refer to Figure 3b.

(i) Describe the shape of the pillow structures. [2]

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(ii) Name the most common igneous rock in which such pillow structures occur. [1]

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(iii) Explain why each of the pillow structures has a very fine-grained rim. [2]

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(c) Refer to the evidence shown in **Figure 3a** and **Figure 3b**.

(i) Evaluate the accuracy of the dip direction and relative movement of Fault **F** shown in **Figure 3c**. Give reasons for your answer. [3]

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(ii) Evaluate the statement “*the shale is the youngest rock to the north-west of fault F*”. Give reasons for your answer. [4]

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[Total 17 marks]

4. **Figure 4a** is a diagram of metamorphic rock **P**.

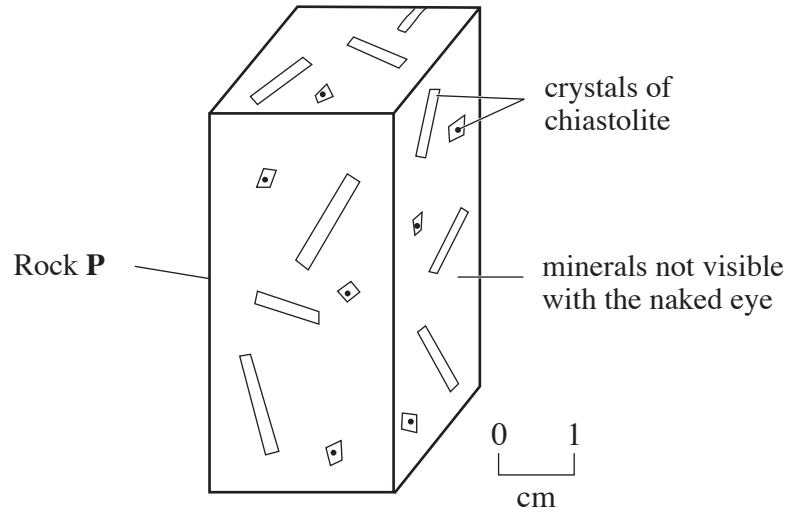


Figure 4

(a) Describe the texture of the crystalline rock **P** shown in **Figure 4**. [3]

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(b) Explain the processes by which metamorphism has formed rock **P**. [3]

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(c) Schist can form under the same temperature conditions as rock **P** and from the same original rock but has a very different mineralogy and texture.

(i) Name one common mineral in schist. [1]

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(ii) State **two** differences between the texture of rock **P** and the texture of schist. [2]

Difference 1

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Difference 2

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(iii) Explain why rock **P** and schist have different textures. [2]

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[Total 11 marks]

