

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

C480U20-1



WEDNESDAY, 21 MAY 2025 – AFTERNOON

GEOLOGY – Component 2

Investigative Geology

1 hour 30 minutes

ADDITIONAL MATERIALS

In addition to this examination paper you will need:

- the Map Extract
- the Data Sheet
- a strip of plain paper
- a calculator
- a protractor
- a ruler.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	16	
2.	16	
3.	18	
4.	17	
5.	13	
Total	80	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

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

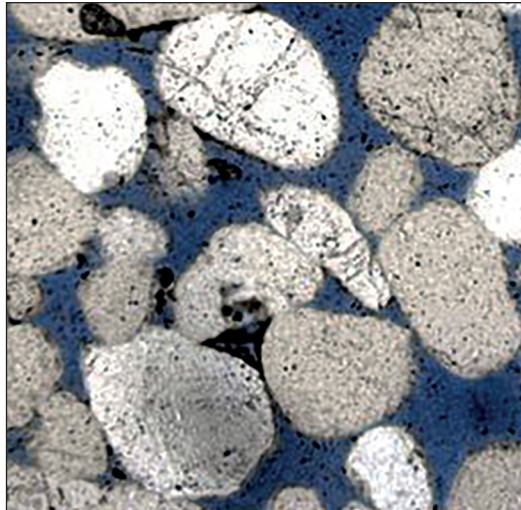
The assessment of the quality of extended response (QER) will take place in question 5(c).



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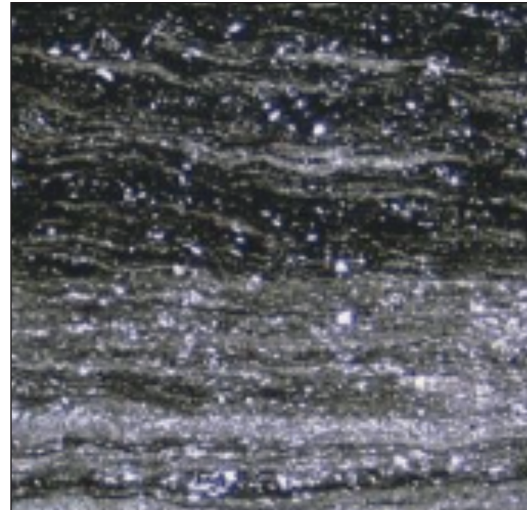
Answer **all** questions.

1. **Figure 1a** shows a microscope view of **Rock Unit A** on **Map 1**.
Figure 1b shows a microscope view of **Rock Unit B** on **Map 1**.



0 1
mm

Figure 1a



0 1
mm

Figure 1b

- (a) (i) Complete the description of **Rock Unit A** in **Table 1** using information from **Figure 1a**. You may wish to refer to the Data Sheet.

[2]

	Rock Unit A	Rock Unit B
Mean grain size	1.0 mm	0.04 mm
Shape	•	flat grains
Sorting	•	well sorted
Composition	quartz	mainly clay minerals

Table 1

- (ii) State the name of the rock forming **Rock Unit A**.

[1]

.....

- (iii) State the name of the rock forming **Rock Unit B**.

[1]

.....



- (b) **Figure 1c** shows the relationship between permeability and mean grain size of some sedimentary rocks.

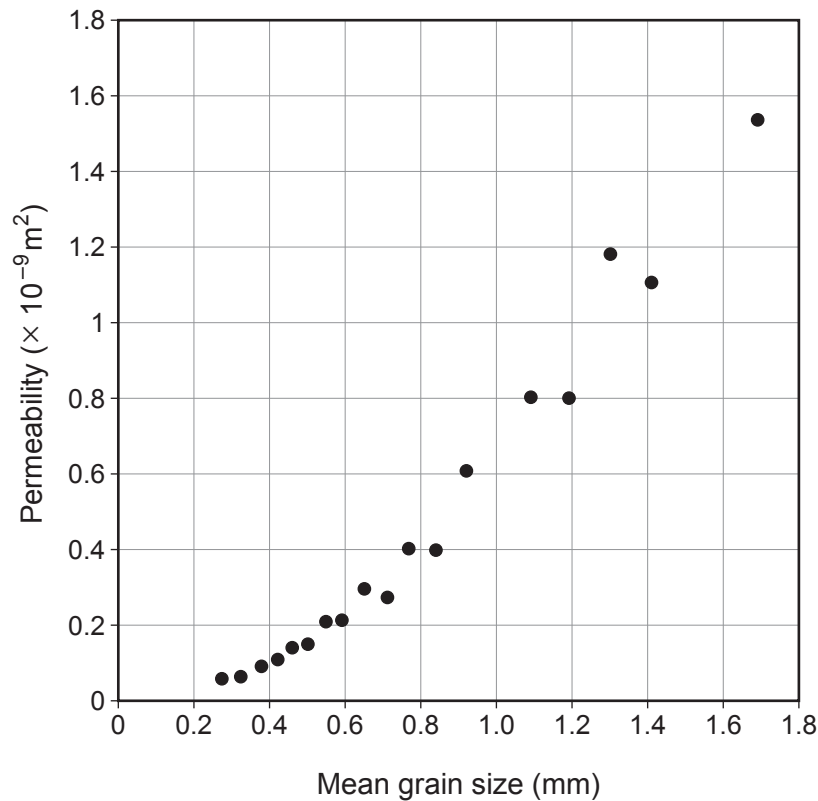


Figure 1c

- (i) **Rock Unit A** has a permeability of $0.8 \times 10^{-9} \text{ m}^2$. Using the mean grain size value in **Table 1**, plot the data for **Rock Unit A** on **Figure 1c**. [1]
- (ii) Draw a line of best fit on **Figure 1c**. [1]
- (iii) Using the mean grain size value for **Rock Unit B** in **Table 1**, state which **one** of the following is the most likely permeability of **Rock Unit B**. Tick (✓) only **one** box. [1]

$0.8 \times 10^{-9} \text{ m}^2$

☐

$0.1 \times 10^{-9} \text{ m}^2$

☐

$0.05 \times 10^{-9} \text{ m}^2$

☐


- (c) (i) Refer to **Figure 1c**. Describe the relationship between permeability and mean grain size. [2]

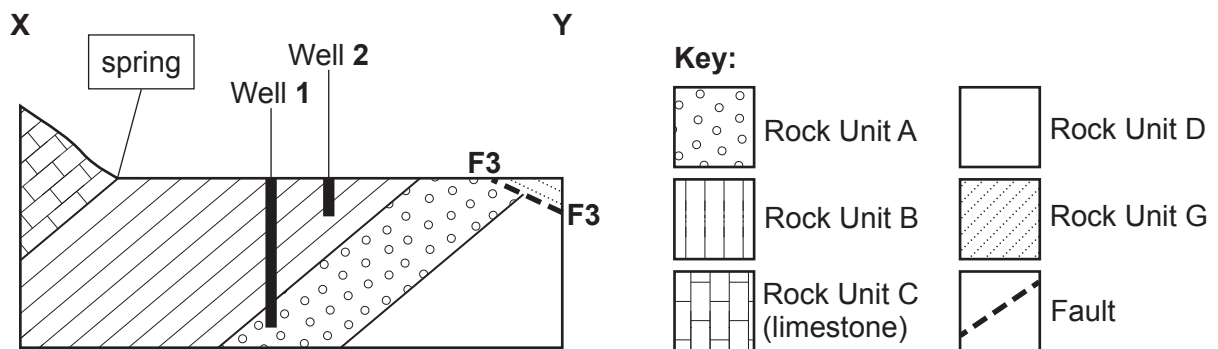
.....

.....

- (ii) State **one** factor other than grain size that affects the permeability of a rock. [1]

.....

- (d) **Figure 1d** is a cross-section along line X–Y on **Map 1**.



cross-section not to scale

Figure 1d

- (i) Explain why there is a spring at the location shown on **Figure 1d**. [2]

.....

.....

.....



- (ii) Refer to **Figure 1c** and **Figure 1d**. Evaluate the suitability of Well 1 and Well 2 as a potential source of a water supply. [4]

Well 1

.....

.....

Well 2

.....

.....

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2. **Figure 2a** is a photograph of a rock outcrop at **Locality 1** on **Map 1**.

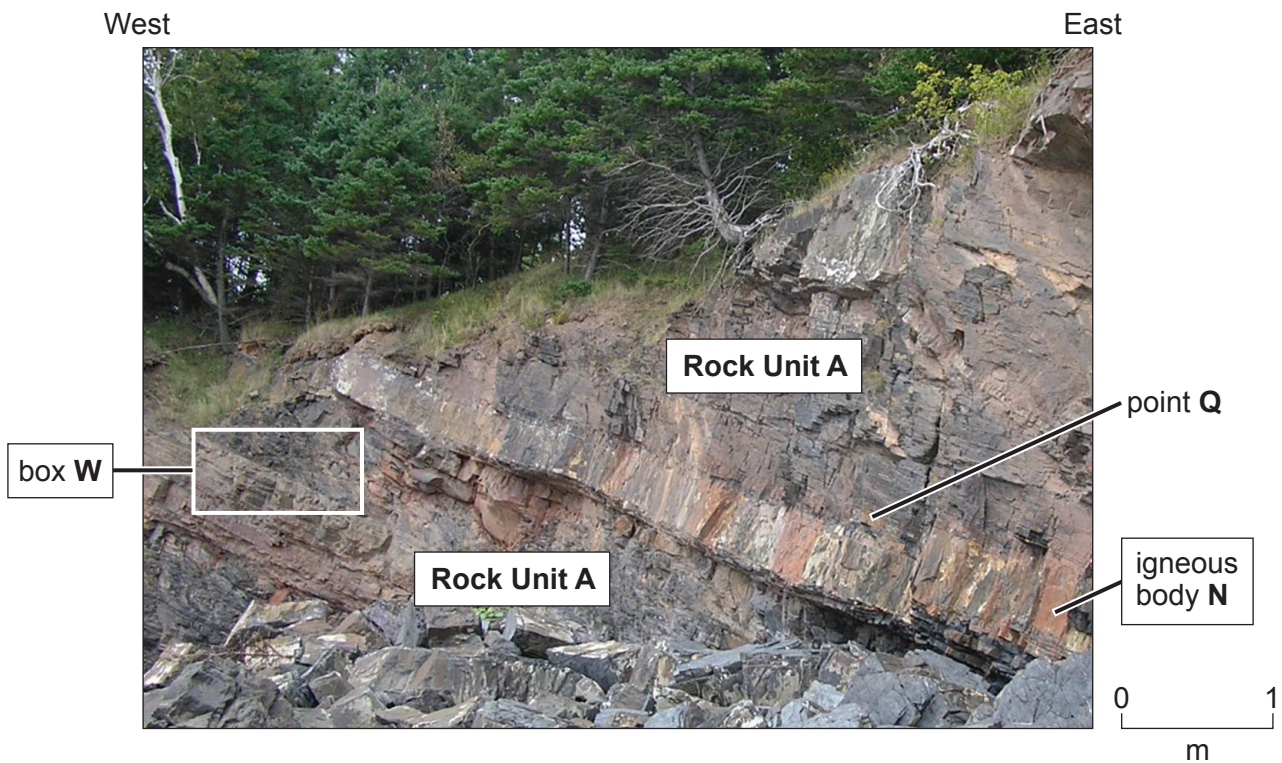


Figure 2a

(a) Refer to **Figure 2a**.

- (i) State the angle of dip of **Rock Unit A** as it appears in box **W** on **Figure 2a**. [1]

.....°



- (ii) In **Figure 2b**, draw to scale the main geological features shown in **Figure 2a**. [3]

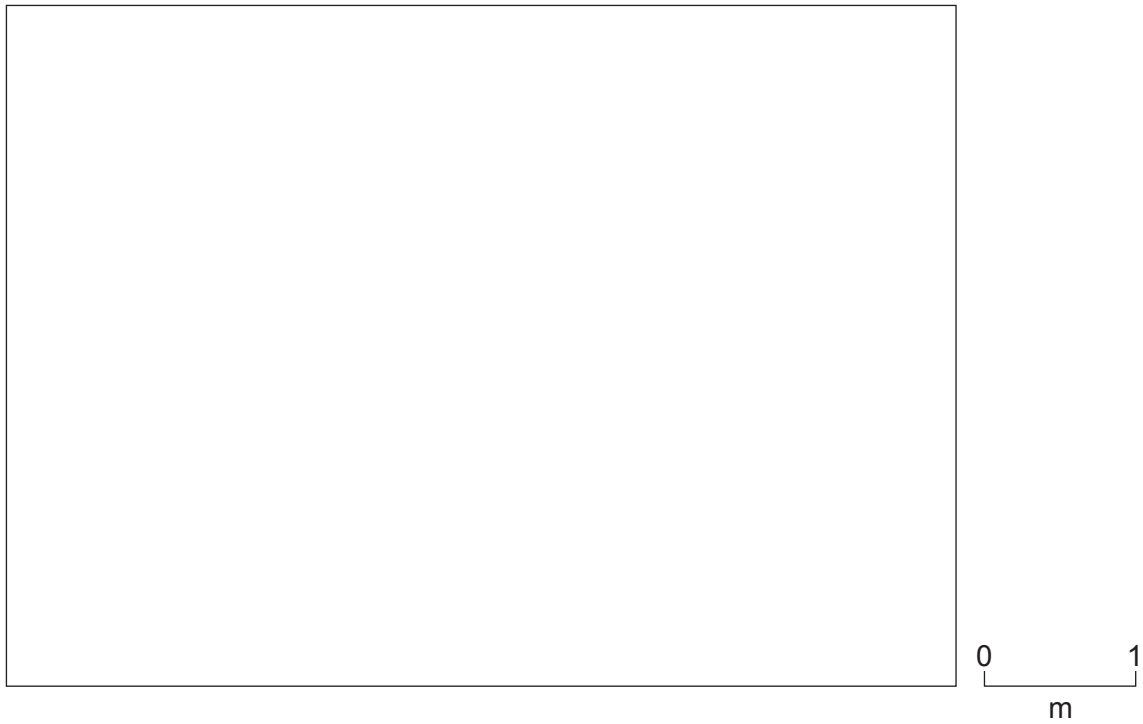
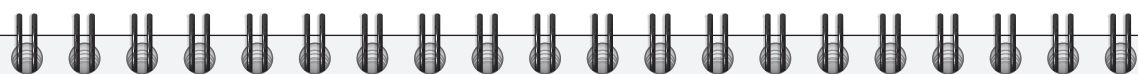


Figure 2b



(b) **Figure 2c** shows field notes taken at **Locality 1 (Figure 2a)**.



Date: 14/03/25

Locality 1. Grid reference 471 342

Rock Unit N (igneous body N):

Texture:

Interlocking crystals

Crystal size all 2.5mm

Composition:

Dark in colour

Minerals found: augite, feldspar and olivine

Weather conditions: overcast and drizzle

Rock Unit A at point Q:

Texture:

Interlocking crystals

Composition:

Light in colour

Made of one mineral; it is not scratched with a steel pin. It does not react with dilute hydrochloric acid

Figure 2c

- (i) **Table 2** refers to tests/observations **most useful** for distinguishing between olivine and augite found in **Rock Unit N**.

Complete **Table 2** with details of an additional relevant test/observation by:

- stating a test/observation
- describing the test/observation
- stating the result.

You may wish to use the Data Sheet.

[3]

Test/observation	Description of test/observation	Result of test/observation
colour	observe the mineral in natural light	augite is black, whereas olivine is green
•	•	•

Table 2



- (ii) Refer to **Figure 2c** only. Describe the evidence that **Rock Unit N** forms
- an intrusion
 - which cooled at one rate.

[2]

.....

.....

.....

.....

- (c) (i) Refer to **Figure 2a** and **Map 1** only. State the type of intrusion forming igneous body **N**.
Give **two** reasons for your answer.

[3]

Type of intrusion

Reason 1

.....

Reason 2

.....

- (ii) Refer to **Figure 2a** and **Figure 2c**. Evaluate the statement '**Rock Unit A** at point **Q** has
- undergone contact metamorphism
 - to form marble'.

[2]

.....

.....

.....

.....

- (d) State **two** safety measures that should be taken when undertaking fieldwork at **Locality 1** in **Figure 2a**.

[2]

Safety measure 1

.....

Safety measure 2

.....

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3. **Figure 3a** is a photograph taken at **Locality 2** on **Map 1**. **Figure 3b** shows the grain size distribution of a sand sample, sand **Z**, collected at **Locality 2**.



Figure 3a

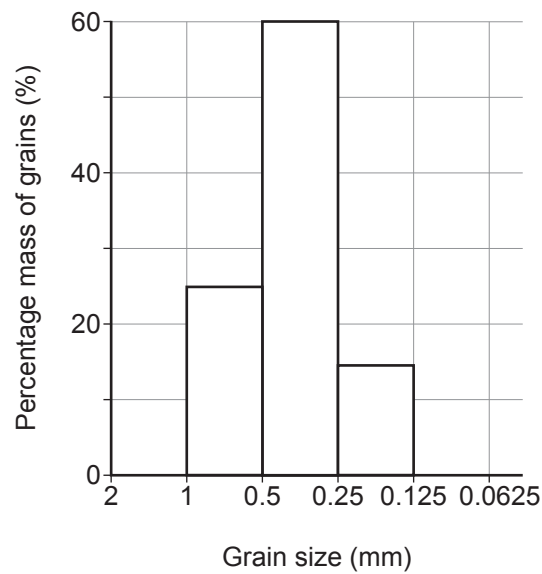


Figure 3b

- (a) (i) Refer to **Figure 3b**. Describe the texture of sand **Z**.

[2]

.....

.....

.....



- (ii) A second sand sample, sand **T**, was collected from **Locality 3** on **Map 1**. It is more poorly sorted than sand **Z** and has a coarser mean grain size. Draw a bar chart in **Figure 3c** to show the grain size distribution of sand **T**. [3]

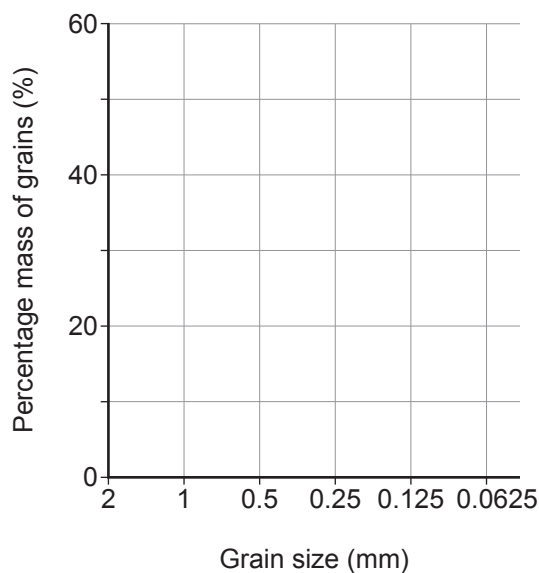


Figure 3c

- (b) Use the information in **Figure 3b**. Complete **Figure 3d** to show the texture of sand **Z**. Sand **Z** has rounded grains. [3]

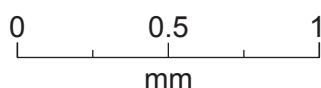


Figure 3d



- (c) State which sand, **T** or **Z**, has undergone a greater amount of transport. Explain your answer. [3]

.....

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.....

- (d) (i) State the name of structure **V** in **Figure 3a** and explain how it forms. You may wish to draw a labelled diagram. [3]

Name

Explanation

.....

.....

- (ii) Structure **V** in **Figure 3a** can be used to interpret past environments. State the name of the principle that is summarised by the phrase 'the present is the key to the past'. [1]

.....

- (e) Explain how the remains of the tree in **Figure 3a** provides evidence for past sea level change. [3]

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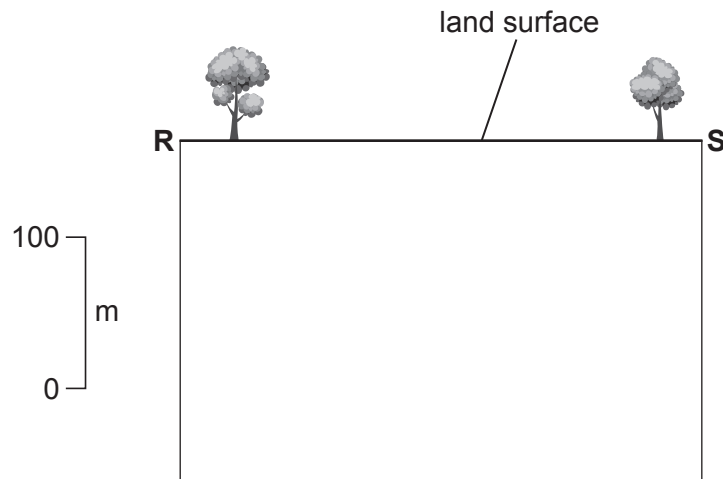
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4. Refer to **Map 1**.

- (a) (i) **Figure 4** is a blank geological cross-section along line **R–S** on **Map 1**. Draw the geological cross-section in **Figure 4** along the line **R–S**. **Fault F1** has a dip of 50° to the west.

[6]

**Figure 4**

- (ii) Complete **Table 3** which refers to **Fault F1**.

[3]

dip angle	50°
dip direction	west
strike direction	•
upthrown side	east
fault type	•
stress type	•

Table 3

- (b) (i) Calculate the surface outcrop width of **Rock Unit C** south of **Fault F2**. Show your working. [2]

..... m

- (ii) Explain why the outcrop width of **Rock Unit C** is different on either side of **Fault F2**. [2]

.....

.....

.....

.....

- (c) A student stated that **Rock Unit P** on **Map 1** forms a pluton. Evaluate this statement with reference to the evidence on **Map 1**. [4]

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5. **Figure 5a** shows a microscope view of **Rock Unit G** on **Map 1**.

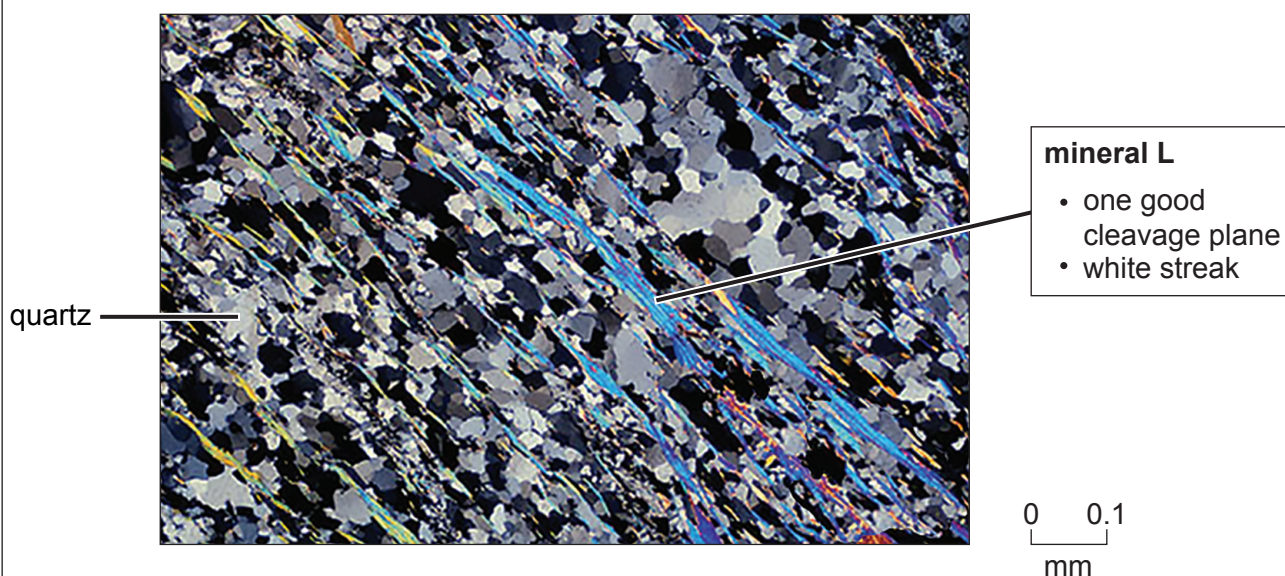


Figure 5a

(a) Refer to **Figure 5a**.

Complete **Table 4** using information from **Figure 5a**.

[4]

You may wish to use the Data Sheet.

name of mineral L	•
name of crystalline texture	•
name of rock forming Rock Unit G	•
type of metamorphism	•

Table 4



- (b) **Figure 5b** is a photograph of a cephalopod fossil collected from **Rock Unit E** on **Map 1**.



Figure 5b

- (i) Refer to **Figure 5b** only. State the type of cephalopod shown. Give a reason to support your answer. [2]

Type of cephalopod

Reason

- (ii) The fossil shown in **Figure 5b** existed 380 Ma ago. State the name of the geological **period** to which the fossil belongs. You may wish to refer to the Data Sheet. [1]

- (c) Refer to **Map 1**, **Figure 5a** and **Figure 5b**. A student concluded that the folds, faults, **Rock Unit G** and **Rock Unit H** on **Map 1** formed at a convergent plate boundary during the Palaeozoic Era. Evaluate this statement with reference to:

- folding and faulting
- **Rock Unit G** and **Rock Unit H** (granite)
- the fossil found in **Rock Unit E**

[6 QER]



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Acknowledgements:

Figure 5b Acknowledgment not found



[illegible]