



GCE AS/A Level **LEGACY**

1211/01

GEOLOGY – GL1

FOUNDATION UNIT

MONDAY, 14 MAY 2018 – 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.	15	
2.	15	
3.	16	
4.	14	
Total	60	

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

the Mineral Data Sheet;

a protractor.

a calculator.

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. 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.**

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]**

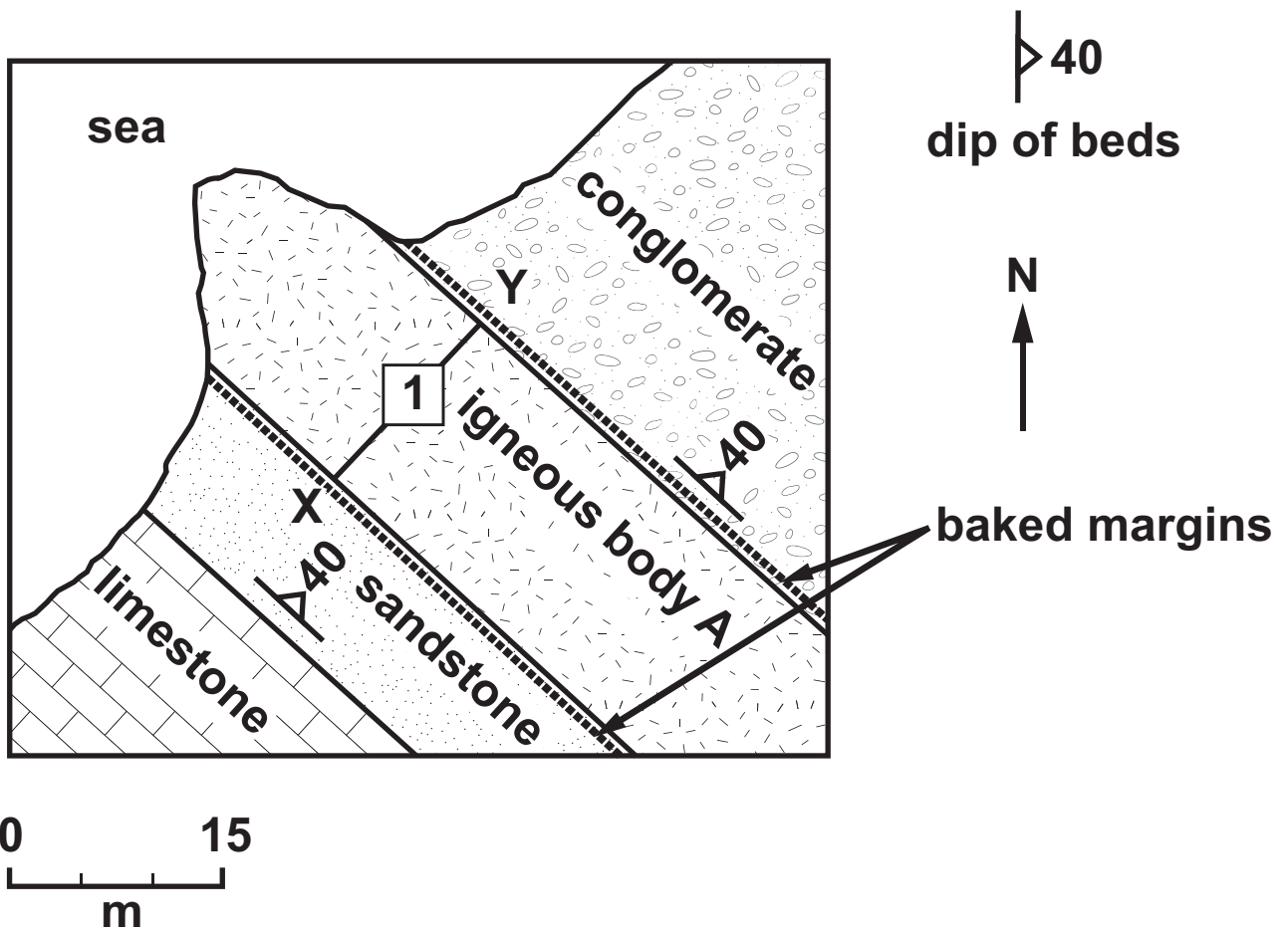


FIGURE 1a

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

1(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]**

**Crystal size
(mm)**

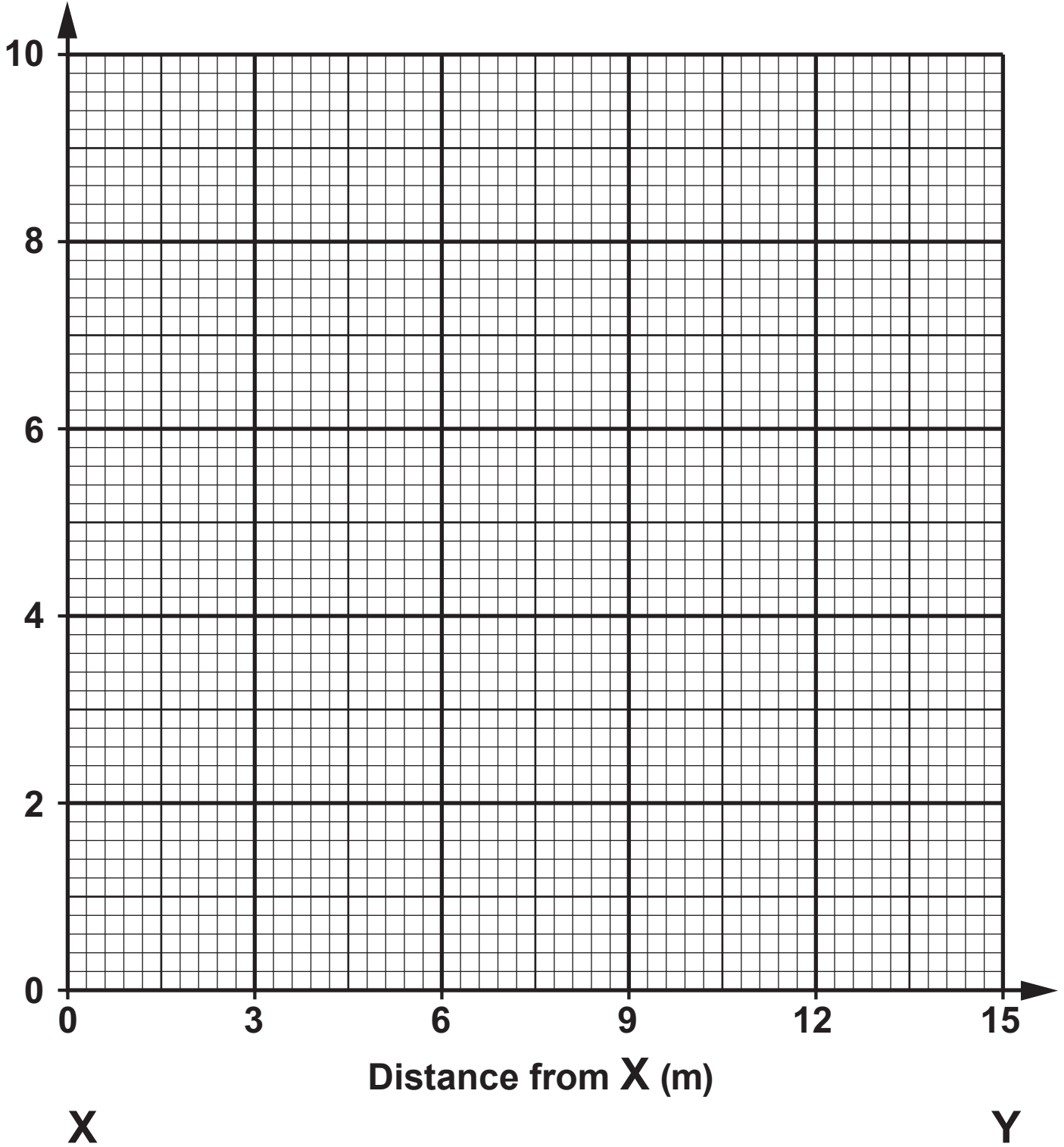
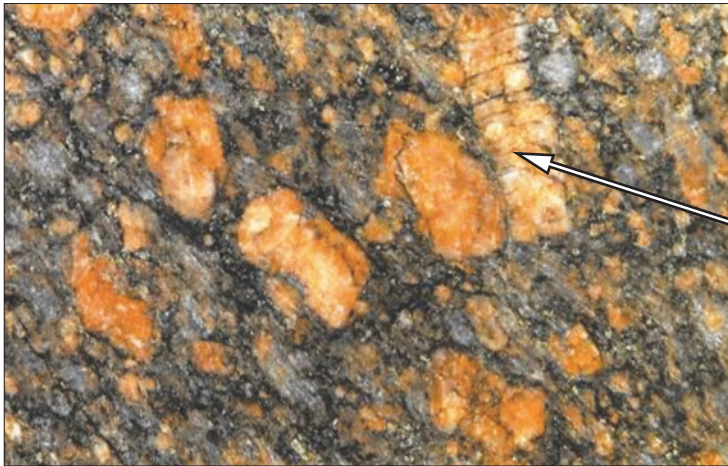


FIGURE 1c

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



Mineral E shows simple twinning and is not scratched by a steel pin

0 20
mm

FIGURE 1d

- (i) State the name of mineral **E** shown in **FIGURE 1d**. You may wish to refer to the **MINERAL DATA SHEET**. [1]
-
-

1(c) (ii) Describe the texture of the igneous rock shown in FIGURE 1d. [2]

(iii) Explain how the texture of the igneous rock shown in FIGURE 1d may have formed. [2]

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

Refer to **FIGURE 2**.

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

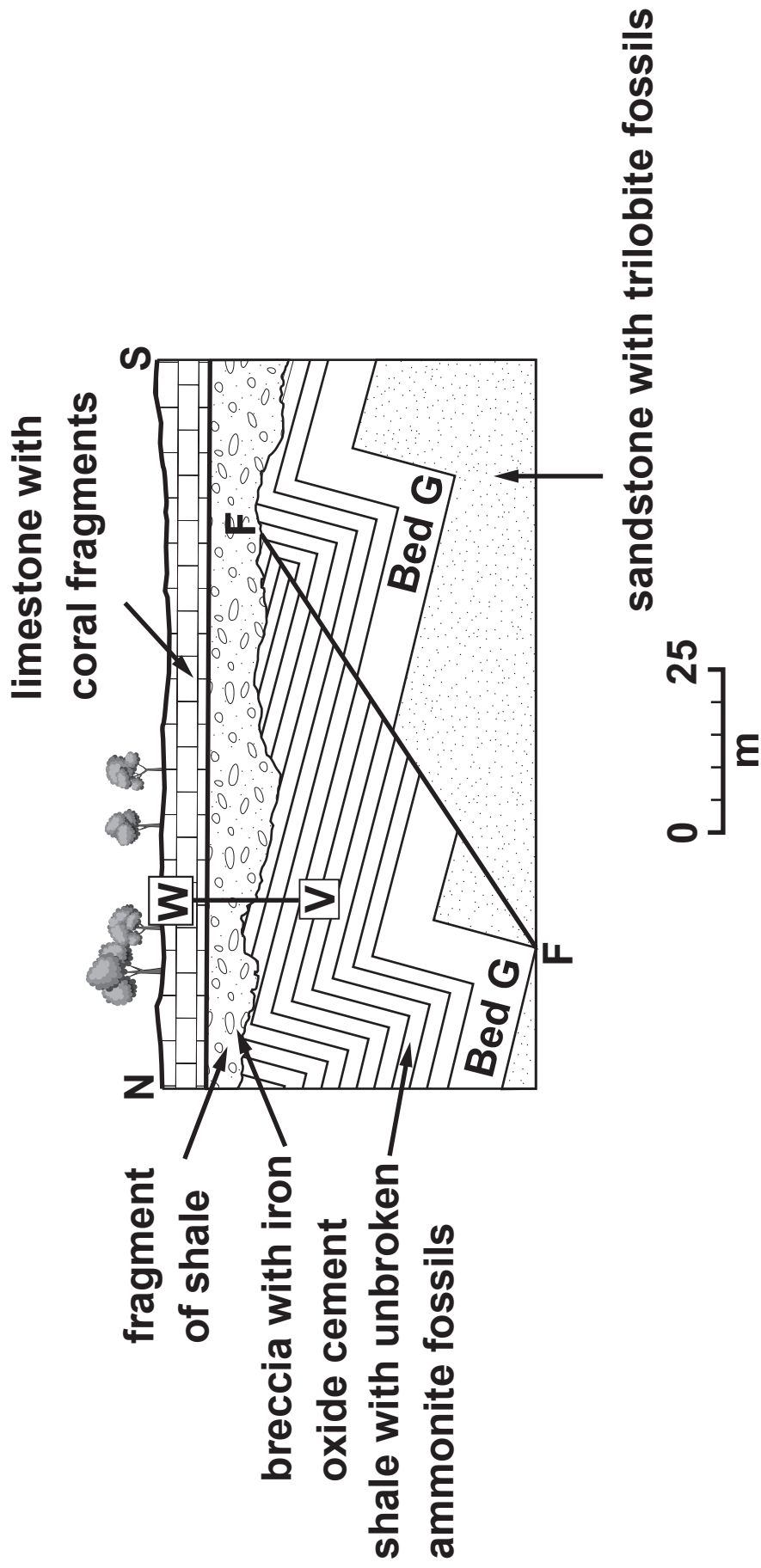


FIGURE 2

2(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

2(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

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

(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]

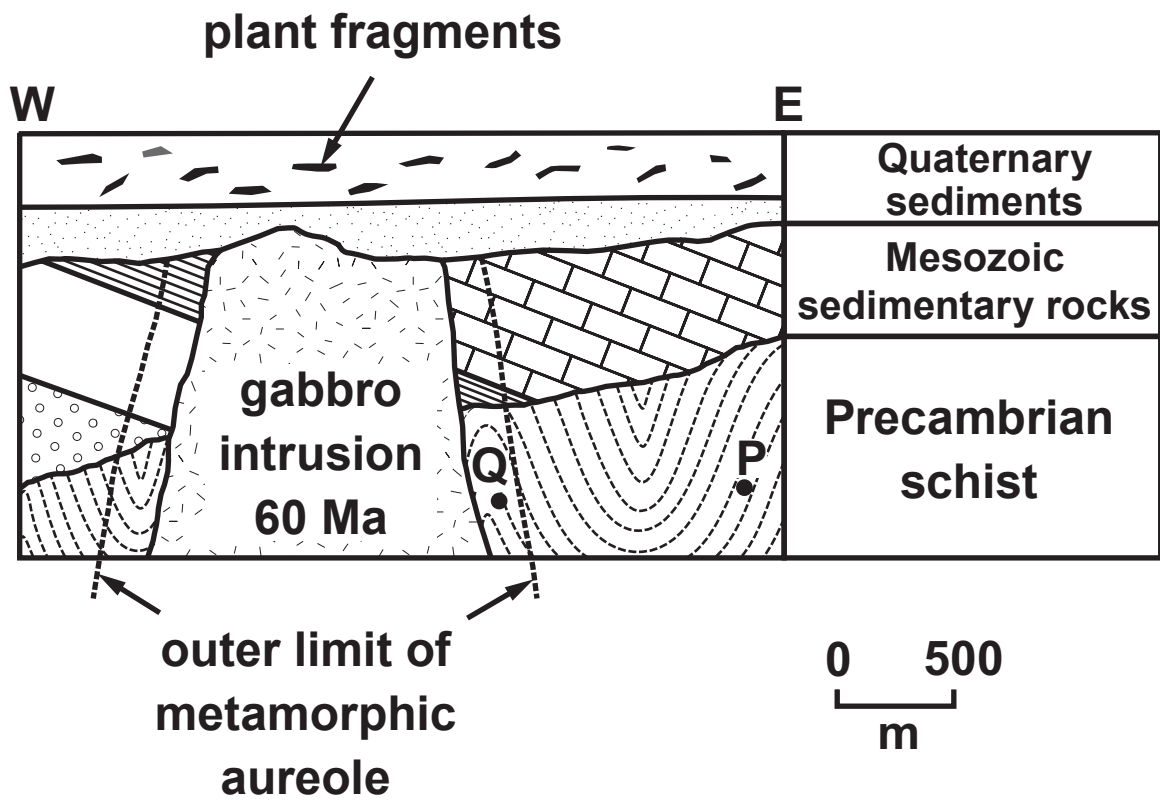


FIGURE 3

3(a) (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	<input type="checkbox"/>	Silurian	<input type="checkbox"/>
Ordovician	<input type="checkbox"/>	Permian	<input type="checkbox"/>
Cretaceous	<input type="checkbox"/>	Jurassic	<input type="checkbox"/>
Triassic	<input type="checkbox"/>	Cambrian	<input type="checkbox"/>

3(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

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

(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

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

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

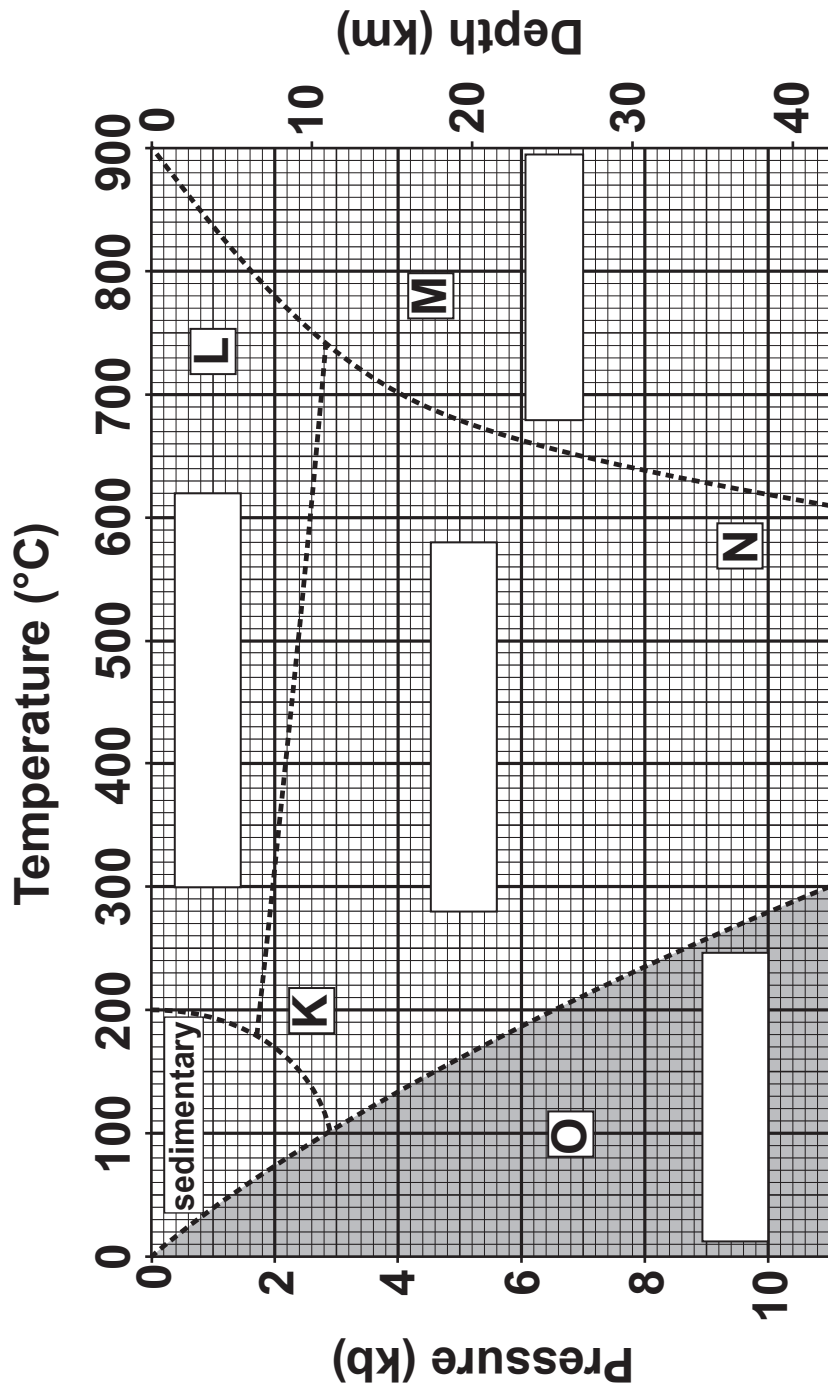


FIGURE 4a

4(a) (iii) Suggest TWO factors that control the temperature at which metamorphic rocks will begin to melt and form igneous rocks.

[2]

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

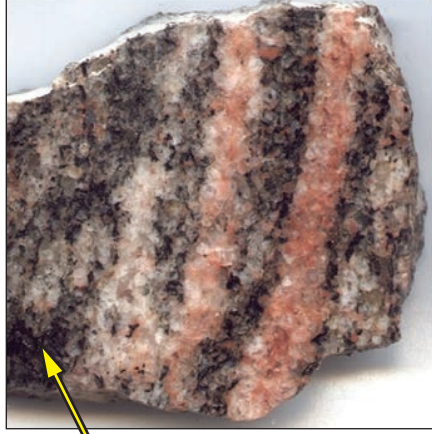
- 4(b) (i) State the name of mineral **X** in **FIGURE 4b** and mineral **Y** in **FIGURE 4c**. You may wish to refer to the **MINERAL DATA SHEET**. [1]

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]
-

Mineral X
dark coloured,
scratched by
a copper coin
and shows
one good
cleavage



0 1
cm

FIGURE 4b

Mineral Y
is not
scratched
by steel and
has a black
spot in the
centre



0 1
cm

FIGURE 4c

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

Difference 1 _____

Difference 2 _____

- (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

