Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1211/01

GEOLOGY – GL1
FOUNDATION UNIT

P.M. THURSDAY, 16 May 2013

1 hour

		Examiner only
1.	**16**	
2.	**16**	
3.	**13**	
4.	**15**	
Total	**60**	

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ADDITIONAL MATERIALS

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

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.

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Answer **all** *questions.*

1. **Figure 1a** shows the geological histories for trilobites and graptolites.

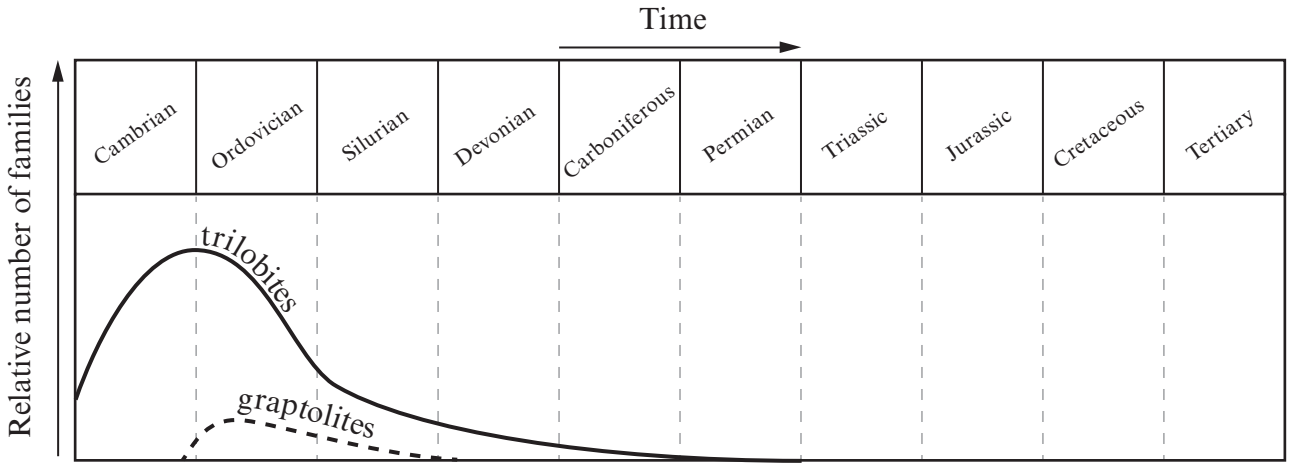

Figure 1a

(a) Refer to **Figure 1a**.

(i) During which geological period did the numbers of families of both trilobites and graptolites begin to decline? [1]

.....

(ii) Describe the geological history of the graptolites with reference to their first appearance, maximum diversity and eventual extinction. [3]

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(iii) State **two** differences between the geological histories of trilobites and graptolites. [2]

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(iv) Graptolites are useful zone fossils in the Palaeozoic era. From your knowledge, describe **two** characteristics of graptolites that make them good zone fossils. [2]

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(b) **Figure 1b** shows a student's field sketch of a number of trilobite fossils on a single bedding plane.

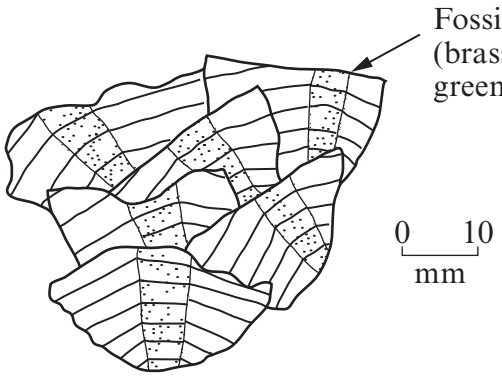

Figure 1b

(i) Name the part of the trilobite that has been preserved in **Figure 1b**. [1]

.....

(ii) The original hard parts of the trilobite are now made of mineral **A**. Using the Mineral Data Sheet, identify mineral **A**. [1]

.....

(iii) Name and describe the process by which the trilobites have been fossilised. [3]

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(iv) A student concluded that the trilobites shown in **Figure 1b** represent a life assemblage. With reference to **Figure 1b** critically evaluate this statement. [3]

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2. Figure 2 shows a cross section parallel to the true dip through an orogenic belt (not to scale).

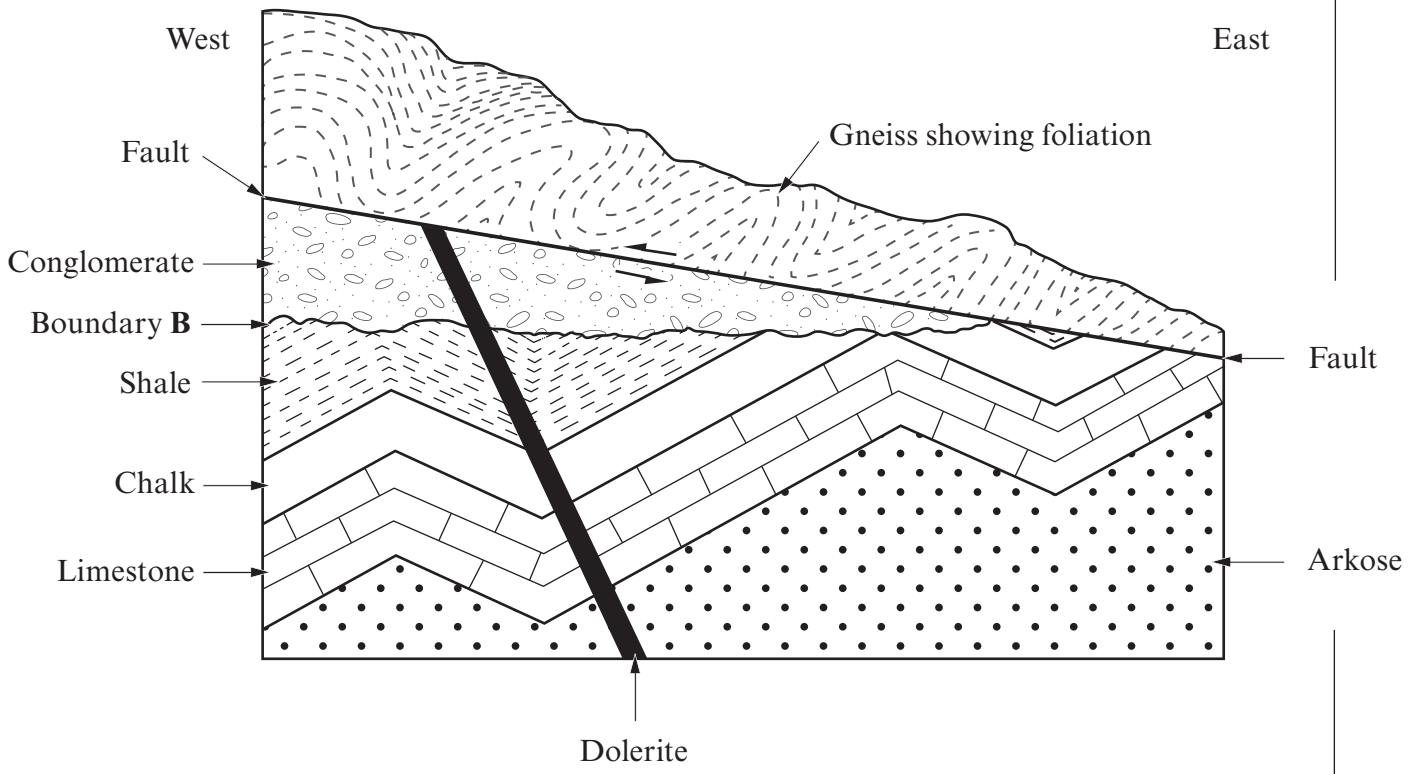

Figure 2

(a) (i) Name **one** metamorphic rock shown in **Figure 2**. ..... [1]

(ii) Indicate which **three** of the following statements most accurately describe the folding below the fault in **Figure 2**. Tick only **three** boxes. [3]

☐ The folds strike north-south

☐ The folds are overturned

☐ The folds strike east-west

☐ The fold limbs dip at different angles

☐ Symmetrical synclines and anticlines (limbs of equal length)

☐ The fold limbs have similar dip angles

☐ Asymmetrical synclines and anticlines (limbs of different lengths)

Examiner only

(b) (i) Name the type of fault shown in **Figure 2**, giving **two** reasons to explain your answer. [3]

Type of fault .....

Reasons .....

.....

.....

(ii) Describe **one** piece of evidence you would look for **in the field** to confirm the presence of the fault shown in **Figure 2**. [2]

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(c) Using **Figure 2** and your knowledge, explain the evidence that boundary **B** separates rock units of very different ages. [3]

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(d) A student concluded that the **gneiss** (showing foliation) and the **dolerite** were the youngest rocks shown in **Figure 2**. Critically evaluate this statement. [4]

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3. **Figure 3a** is a map showing South America and part of the Pacific Ocean. The Pacific sea floor is subdivided based on the age of ocean floor sediments.

Figure 3b is a graph of data collected along line **B-C** on **Figure 3a**, showing the age of ocean floor sediment based on microfossil content.

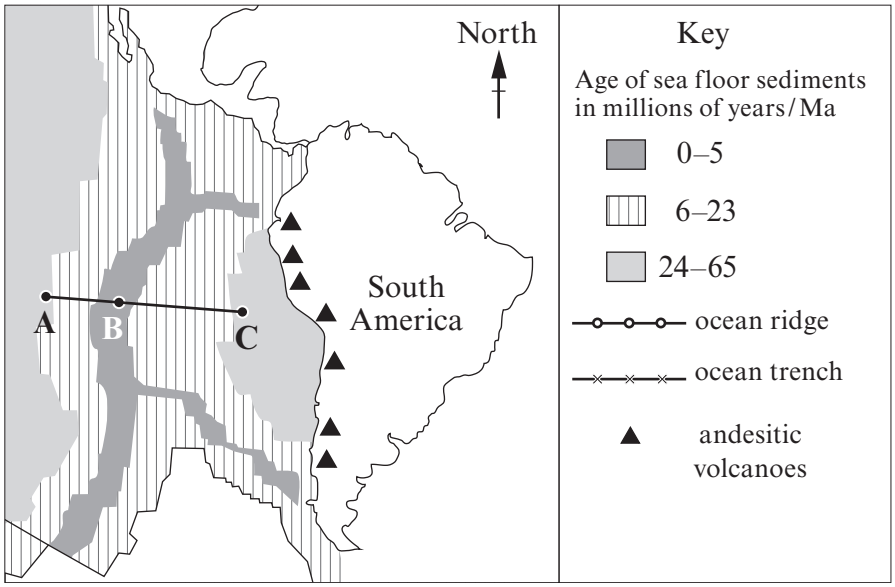

Figure 3a

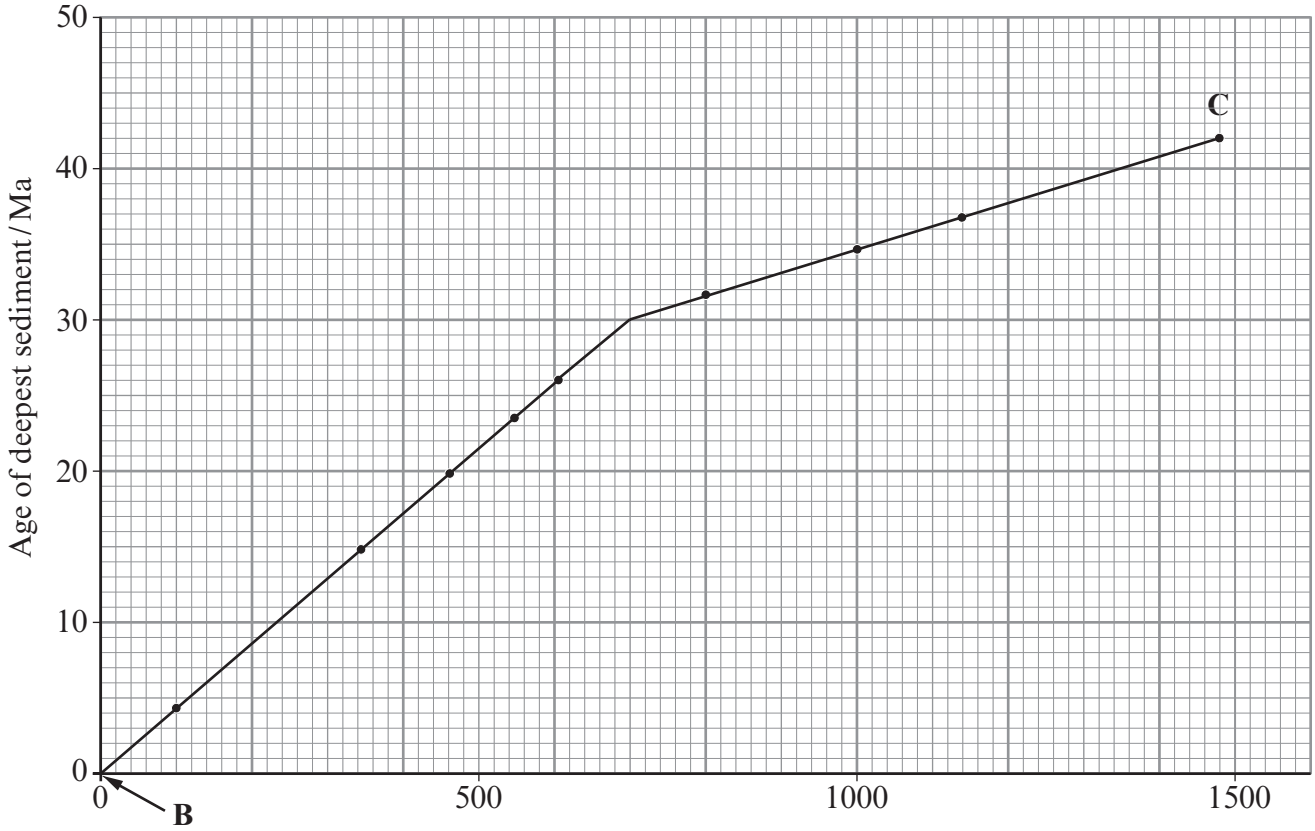

Figure 3b

Examiner only

(a) (i) Refer to **Figure 3a**. Using the symbols in the key mark on **Figure 3a**, the most likely position of:

1. An ocean ridge;

2. An ocean trench. [2]

(ii) Using **Figure 3a**, describe how the age of the Pacific Ocean floor varies along line **A-B-C**. [2]

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

(i) Calculate the average rate of spreading (in centimetres per year) from the divergent boundary over the **last 30** million years. Show your working. [2]

..... cm yr^{-1}

(ii) Describe how the rate of spreading has **changed** over the last 42 million years. [2]

.....

.....

.....

(iii) The data plotted on **Figure 3b** are based on the study of microfossils in sea floor sediment. Outline **one** other method that could be used to date the oceanic lithosphere. [2]

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(c) With reference to **Figure 3a** describe and explain the origin of the andesitic magma beneath the volcanoes along the western edge of South America. [3]

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4. **Figure 4a** shows an exposure of granite on Dartmoor in south west England.

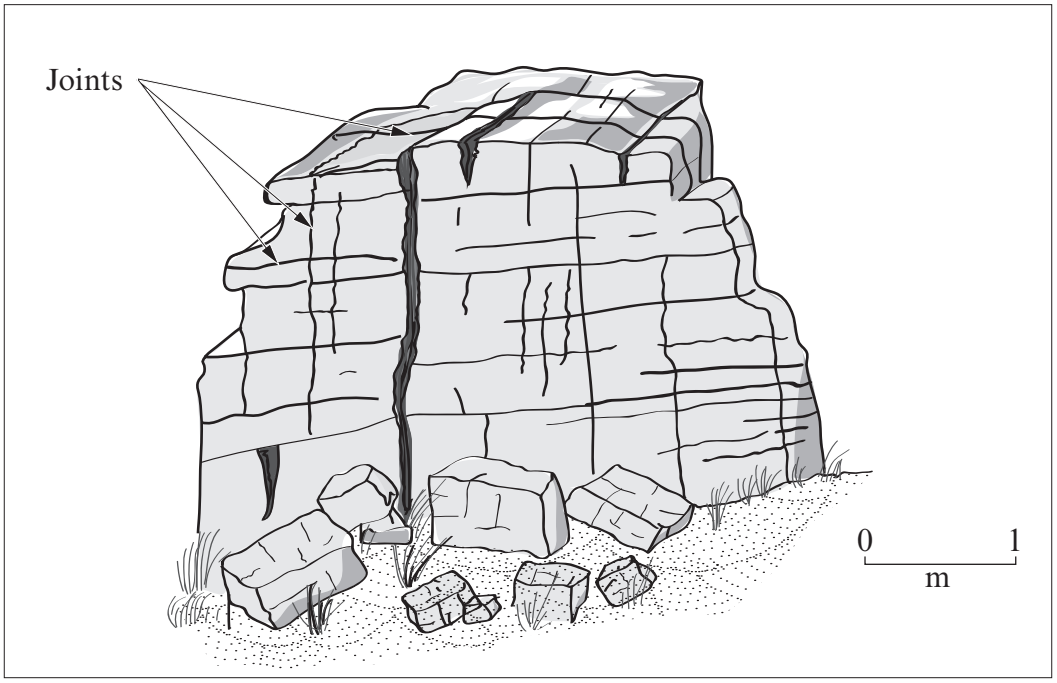

Figure 4a

(a) (i) Describe the pattern of joints shown in **Figure 4a**. [2]

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(ii) Suggest **one** possible way in which the joints may have formed in **Figure 4a**. [1]

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(iii) Name and describe **one** process that may be responsible for the loose angular blocks of rock at the base of the exposure shown in **Figure 4a**. [3]

Name .....

Description .....

.....

.....

(b) **Figure 4b** is a photograph of a sediment derived from the weathering and erosion of the granite shown in **Figure 4a**.

Examiner only

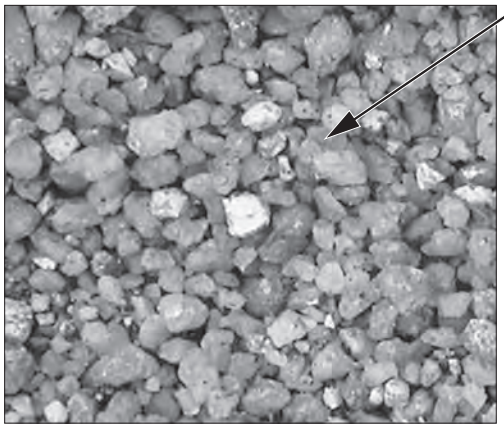

Figure 4b

	Mineral Content	
	Granite (**Figure 4a**)	Sediment (**Figure 4b**)
Quartz	40%	85%
Feldspar	55%	12%
Mica	5%	3%

Table 4c

(i) Using the Mineral Data Sheet, identify mineral **B** in **Figure 4b**. [1]

.....

(ii) Describe the size, shape and sorting of the sediment shown in **Figure 4b**. [3]

Size .....

Shape .....

Sorting .....

Refer to **Figure 4a**, **Figure 4b** and **Table 4c**.

(iii) Suggest reasons to account for the differences in mineral content between the granite in **Figure 4a** and the sediment in **Figure 4b**. You may wish to use the Mineral Data Sheet. [2]

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(iv) A student concluded that the sediment shown in **Figure 4b** had been formed by aeolian processes. Critically evaluate this statement. [3]

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END OF PAPER

GCE AS/A level

1211/01-A
1212/01-A

GEOLOGY

MINERAL DATA SHEET FOR USE WITH GL1 and GL2a

May 2013

Name		Cleavage/Fracture	Hardness	Density $g\,cm^{-3}$	Streak	Lustre	Colour	Other diagnostic properties
Quartz	RF	*none/conchoidal	7	2.65	scratches streak plate	vitreous	colourless, milky but variable	hexagonal prisms terminated by pyramids
Orthoclase Feldspar	RF	*2 good, 90	*6	2.6	scratches streak plate	vitreous	flesh, pink, white	*simple twin
Plagioclase Feldspar	RF	*2 good, 90	*6	2.7	scratches streak plate	vitreous	creamy-white, grey, colourless	*repeated multiple twin
Muscovite Mica	RF	*1 perfect (basal)	*2.5	2.7-3.1	white	pearly	colourless or pale yellow, green or brown	*flaky
Biotite Mica	RF	*1 perfect (basal)	*2.5-3	2.7-3.1	white	pearly	brown/black	*flaky
Hornblende	RF	*2 good, 60/120	*5-6	3.0-3.5	scratches streak plate	vitreous	black, dark green	prismatic crystals
Augite	RF	*2 good, 90	*5-6	3.2-3.5	scratches streak plate	vitreous	greenish black	prismatic crystals
Olivine	RF	none/conchoidal	*6-7	3.2-4.3	scratches streak plate	vitreous	*olive green	
Chiastolite/ Andalusite		poor 1/ uneven fracture	7.5	3.1-3.3	scratches streak plate	vitreous	pearly grey/pink	needle crystals with square x-sections, black centre
Garnet		none	*6.5-7.5	3.5-4.3	scratches streak plate	vitreous	red/brown	*12 sided crystals - each face rhomb shaped
Chlorite		1 good (basal)	*2	2.6-2.9	white	pearly	green	fibrous/flaky as massive, tabular crystals
Calcite	RF	*3 good, not at 90, perfect rhombs	*3	2.71	white	vitreous	colourless, white, tints	*effervesces with 0.5M HCl, rhombic shape
Fluorite		*4 good, parallel to octahedron	*4	3.0-3.2	white	vitreous	colourless purple/green/yellow	fluoresces in uv light, cubic or octahedral crystals
Halite		3 good, 90 cubic	*2.5	2.2	white	vitreous	colourless, white, often stained	*salty taste cubic crystals, often stained
Gypsum		1 good (basal)	*1.5-2	2.3	white	silky, pearly	colourless, white, often stained	fibrous or twinned crystals
Barites		2 good, 90	*3-3.5	*4.5	white	vitreous, resinous	white, pink	bladed crystals
Chalcopyrite		poor/conchoidal	4	4.2	*black	metallic	bronze yellow	*tarnished to peacock colours
Pyrite		none/conchoidal	*6	5.0	*greenish black	metallic	brass yellow	crystals often striated cubes
Galena		*3 good, 90 cubic	*2.5	*7.5	*lead grey	metallic	lead grey	cubic crystals
Haematite		poor/subconchoidal	*5.5-6.5	4.9-5.3	*cherry red	metallic-dull	red/black skin/steel grey	kidney shaped masses, fibrous

* - Useful property for diagnosis RF - Common rock-forming mineral

This table should not be memorised.
Marks in the examinations will be awarded for description of the outcomes of tests on minerals and, on some occasions, identification from test results.