



**GCE AS**

**B480U20-1**

**THURSDAY, 26 MAY 2022 - MORNING**

**GEOLOGY – AS component 2**  
**Foundation Geology**

**1 hour 30 minutes plus your additional time allowance**

**Surname**

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**First name(s)**

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**Centre Number**

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**Candidate Number**

**2**

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## **ADDITIONAL MATERIALS**

**In addition to this examination paper, you will need:**

- a calculator
- a ruler.

## **INSTRUCTIONS TO CANDIDATES**

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

**You may use a pencil for graphs and diagrams only.**

**Write your name, centre number and candidate number in the spaces on the previous 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 questions 3 and 5.**

**(Turn over)**

Answer ALL questions in the spaces provided.

- 1 FIGURE 1a opposite shows a rock exposure.  
FIGURE 1b opposite is a photomicrograph of the rock in FIGURE 1a.

Refer to FIGURE 1a and FIGURE 1b.

- (a) (i) Describe the texture of the rock shown in FIGURE 1b. [3 marks]

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(Turn over)

**1 (a) (ii) State the name of the rock shown in FIGURE 1b.**  
**[1 mark]**

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**(b) The rock outcrop in FIGURE 1a is weathered by chemical processes.**

**(i) Name TWO products of this chemical weathering.**  
**[2 marks]**

1. \_\_\_\_\_

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2. \_\_\_\_\_

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**1 (b) (ii) Explain ONE process likely to be involved in this chemical weathering. [2 marks]**

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**FIGURE 1c opposite shows a weathered surface of the rock shown in FIGURE 1a.**

**1 (c) Describe the possible processes by which lichen in FIGURE 1c is contributing to the weathering of the rock. [2 marks]**

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- 1 (d) Products of weathering from the rocks shown in FIGURE 1a, FIGURE 1b and FIGURE 1c are often deposited by flocculation. Explain the process of flocculation. [3 marks]

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- 2 (b) Grain A is not scratched by a steel pin. Use the information in TABLE 1 and the classification system shown in FIGURE 2a opposite to identify the mineral forming grain A. [1 mark]

Mineral forming grain A \_\_\_\_\_

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**FIGURE 2b** opposite is a model which can be used to determine the flow velocity of a river at the time of deposition based on grain size.

**2 (c) (i)** Using **FIGURE 2b**, complete **TABLE 2** showing the flow velocities at which grain A and grain B were deposited. [1 mark]

**TABLE 2**

<b>Grain</b>	<b>Size (mm)</b>	<b>Flow velocity at deposition (cm s<sup>-1</sup>)</b>
<b>A</b>	<b>3</b>	•
<b>B</b>	<b>11</b>	•

**(Turn over)**

**2 (c) (ii) State TWO features of grains, other than grain size, which might affect the flow velocity at which a grain is deposited. [2 marks]**

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_



- 3** **FIGURE 3a** opposite is a cross-section through an orogenic belt in a collision zone. **FIGURE 3b** opposite is a model produced from laboratory experiments showing the expected continental geotherm and the temperature at which granite begins to melt.

**Refer to FIGURE 3a and FIGURE 3b.**

- (a) (i)** Using **FIGURE 3b**, calculate the geothermal gradient from the surface to the Moho. Show your working. [2 marks]

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**3 (a) (ii) Using FIGURE 3a, calculate the percentage lithospheric thickening beneath point X. Show your working. [2 marks]**

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**(iii) With reference to FIGURE 3b, estimate the depth at which the model predicts granite will begin to melt. [2 marks]**

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**(Turn over)**



**FIGURE 3c opposite is a metamorphic rock found at location Y in FIGURE 3a.**

**3 (b) (i) State the name of the rock shown in FIGURE 3c. [1 mark]**

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**(ii) Explain the conditions which lead to the formation of the rock shown in FIGURE 3c. [3 marks]**

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**(Turn over)**





**4** FIGURE 4a opposite shows two specimens (C and D) from separate fossil groups.

Refer to FIGURE 4a.

**(a) (i)** Label the following on specimen C

- umbo
- hinge line. [2 marks]

**(ii)** Draw on FIGURE 4a the line of symmetry for specimen C and the line of symmetry for specimen D. [1 mark]

**(Turn over)**

- 4 (b) Complete TABLE 3 by calculating the width:length ratio of specimen D. Show your working. [2 marks]

TABLE 3

Width : length ratio	
C	1 : 1.19
D	1 : _____

4 (c) State the name of the fossil groups to which specimens C and D belong. [2 marks]

Fossil group C \_\_\_\_\_

Fossil group D \_\_\_\_\_

**FIGURE 4b opposite shows possible habitats for specimen D and the internal structure of specimen D.**

**4 (d) (i) State in which ONE of the habitats (1–5) specimen D is most likely to have lived. Give TWO reasons for your answer. [3 marks]**

**Habitat** \_\_\_\_\_

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**(ii) Explain why mode of life can be more accurately interpreted for specimen D than for trilobites. [2 marks]**

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4 (d) (iii) Explain why the fossil record is biased and incomplete. [3 marks]

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**5** FIGURE 5a opposite shows the location of the 2018 eruption of the Indonesian volcano Anak Krakatoa.

Refer to FIGURE 5a.

(a) (i) Draw an arrow in each of the blank circles on FIGURE 5a to indicate the relative direction of plate movement at these locations. [1 mark]

(ii) State the type of lava (ultra-mafic, mafic, intermediate or silicic) most likely to be erupted at Anak Krakatoa. [1 mark]

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**5 (a) (iii) Explain the processes that lead to the production of magma at this location.**

**[3 marks]**

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**(Turn over)**

**FIGURE 5b opposite shows two satellite images of Anak Krakatoa before and after the explosive eruption on the 22nd December 2018.**

**5 (b) Using the grid in FIGURE 5b, estimate the area of Anak Krakatoa that was destroyed in the explosive eruption. Show your working.**

**[2 marks]**









- 6 **FIGURE 6a** opposite is a geological cross-section showing the true dip of two faults F1 and F2. **FIGURE 6b** shows a specimen of rock X.

Refer to **FIGURE 6a** and **FIGURE 6b**.

- (a) (i) Describe the texture of rock X in **FIGURE 6b**.  
[3 marks]

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- (ii) State the name of rock X. [1 mark]

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(Turn over)

**6 (b) Explain the processes that lead to the formation of boundary R shown in FIGURE 6a. [3 marks]**

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**6 (c) (i) State the type of fault shown by fault F1.  
Give a reason for your answer. [2 marks]**

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**(ii) Calculate the vertical displacement of fault F2.  
Show your working. [2 marks]**

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<b>Question number</b>	<b>ADDITIONAL PAGE, IF REQUIRED. WRITE THE QUESTION NUMBER(S) IN THE LEFT-HAND MARGIN.</b>



<b>Question number</b>	<b>ADDITIONAL PAGE, IF REQUIRED. WRITE THE QUESTION NUMBER(S) IN THE LEFT-HAND MARGIN.</b>

(Turn over)

<b>Question number</b>	<b>ADDITIONAL PAGE, IF REQUIRED. WRITE THE QUESTION NUMBER(S) IN THE LEFT-HAND MARGIN.</b>

(Turn over)

**ACKNOWLEDGEMENTS**

**FIGURE 1a** <https://fineartamerica.com/featured/>

**FIGURE 1b** ESEU <https://www.earthscienceeducation.com/>

**TABLE 1** grain A - <https://www.flickr.com/photos/udgeology/2315098493>

**FIGURE 2a** adapted from [https://www.soinc.org/sites/default/files/uploaded\\_files/MineralIDChartRM2013.pdf](https://www.soinc.org/sites/default/files/uploaded_files/MineralIDChartRM2013.pdf)

**FIGURE 3c** ESEU <https://www.earthscienceeducation.com/>

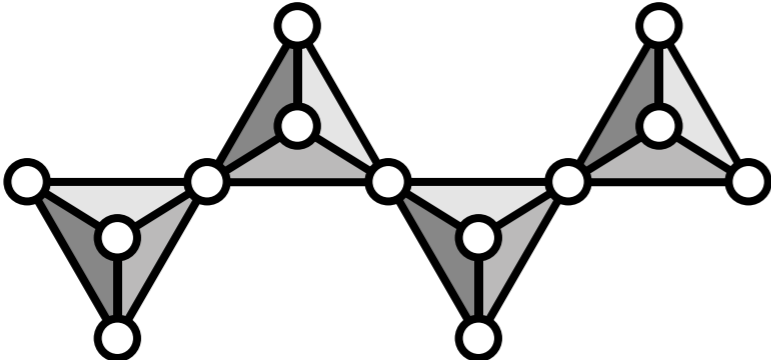

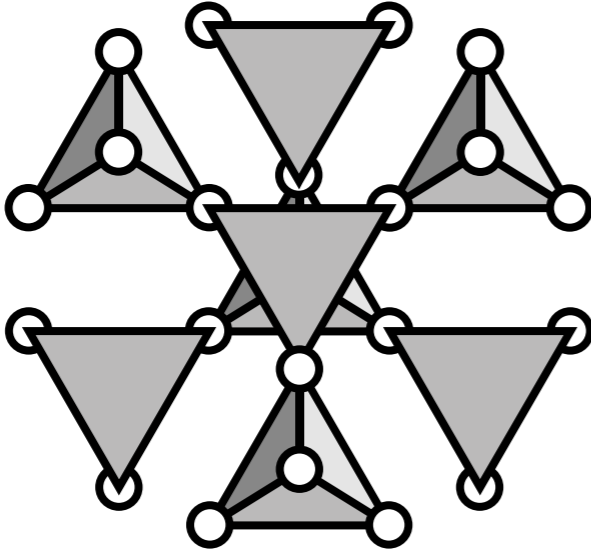

**FIGURE 5a** Google Earth

**FIGURE 5b** [https://www.bbc.co.uk/news/science\\_environment-46743362](https://www.bbc.co.uk/news/science_environment-46743362)

**FIGURE 6b** ESEU <https://www.earthscienceeducation.com/>

<b>For Examiner's use only</b>		
<b>Question</b>	<b>Maximum Mark</b>	<b>Mark Awarded</b>
<b>1</b>	<b>13</b>	
<b>2</b>	<b>14</b>	
<b>3</b>	<b>20</b>	
<b>4</b>	<b>15</b>	
<b>5</b>	<b>13</b>	
<b>6</b>	<b>15</b>	
<b>Total</b>	<b>90</b>	

TABLE 1

	Silicate structure	Name of silicate structure	Mineral	Picture
Grain A		• _____		
Grain B		• _____	Quartz	

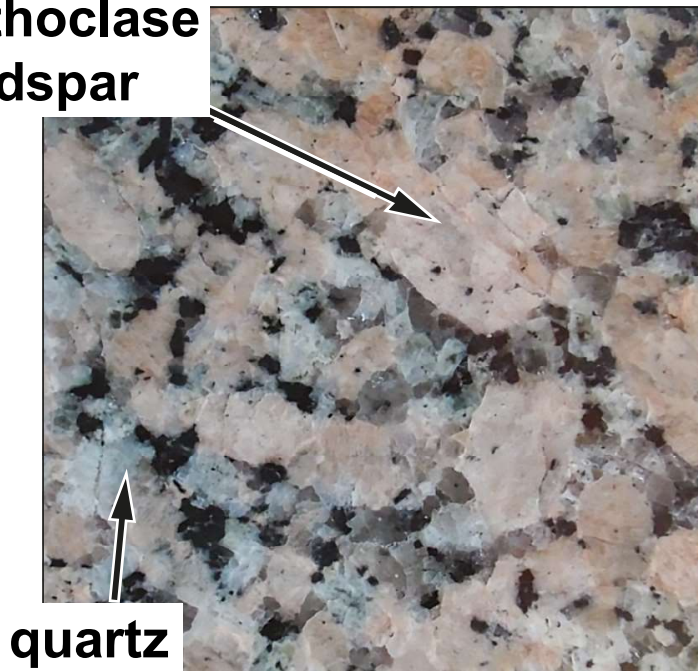
**FIGURE 1a**

**rock shown  
in FIGURE 1b**



**FIGURE 1b**

**orthoclase  
feldspar**



**0 1  
cm**

**FIGURE 1c**

**lichen - a fungus combined with  
some algae attached to the rock**



0 2  
cm

FIGURE 2a

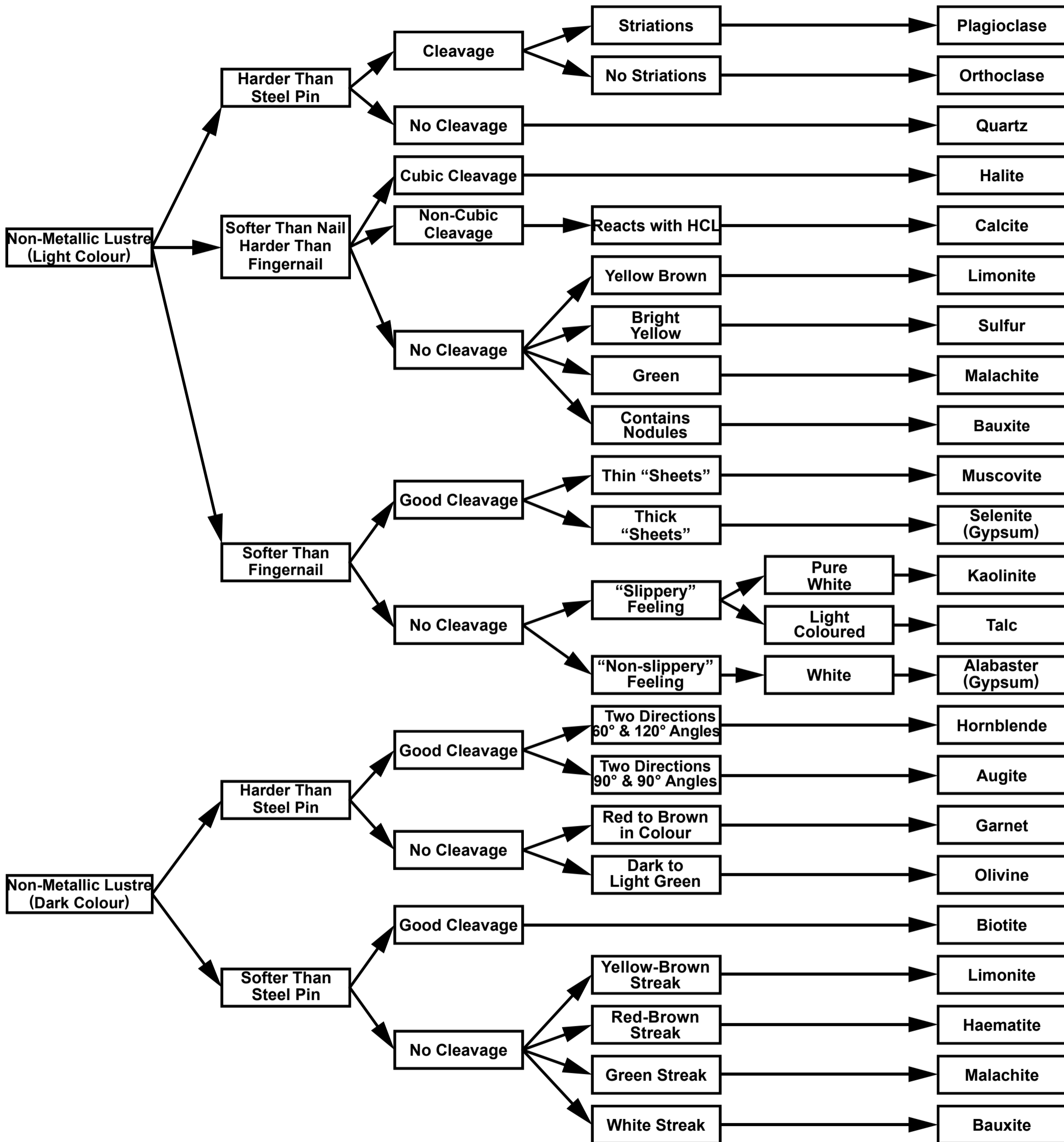


FIGURE 2b

Flow velocity  
( $\text{cm s}^{-1}$ )

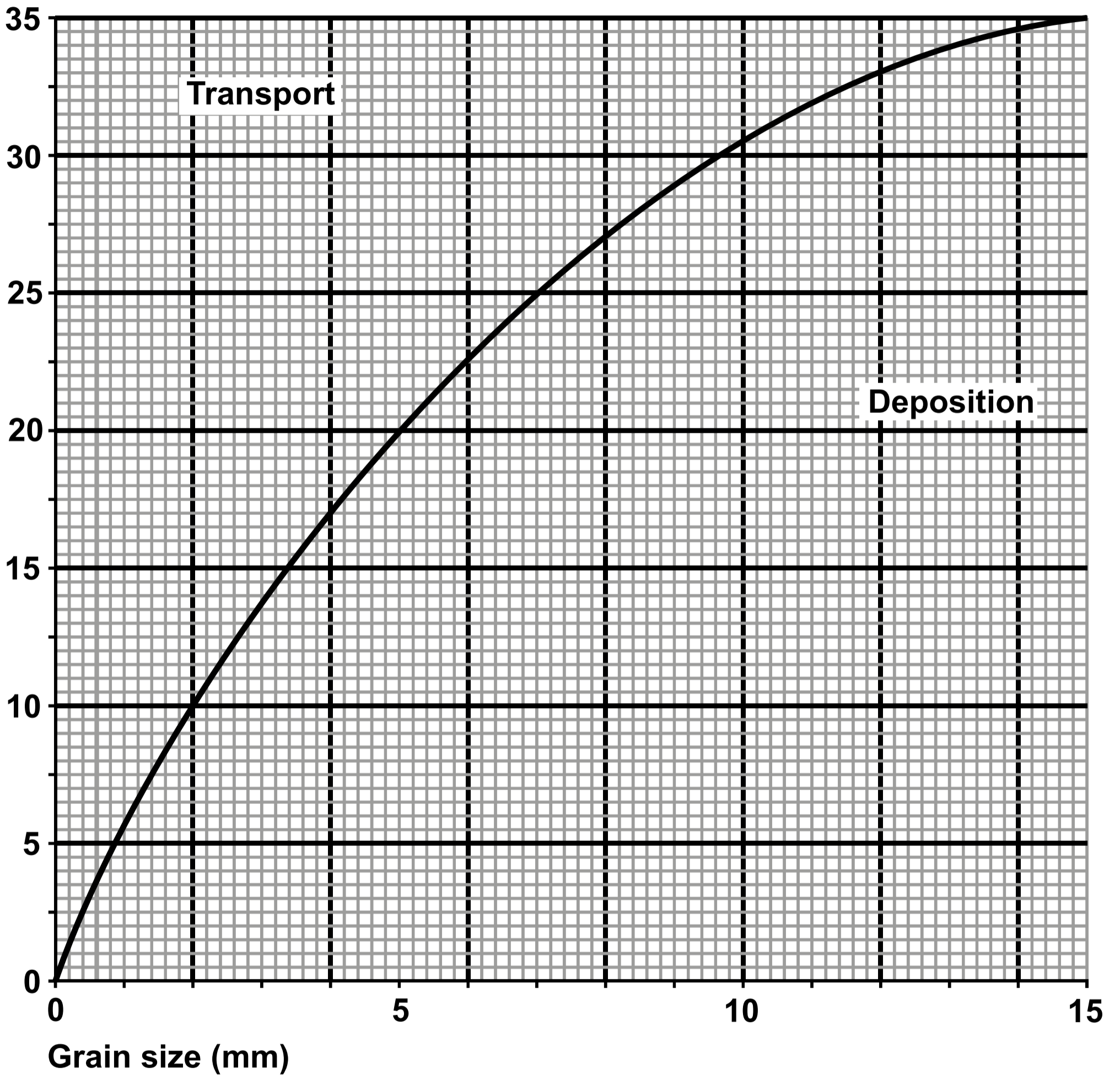


FIGURE 3a

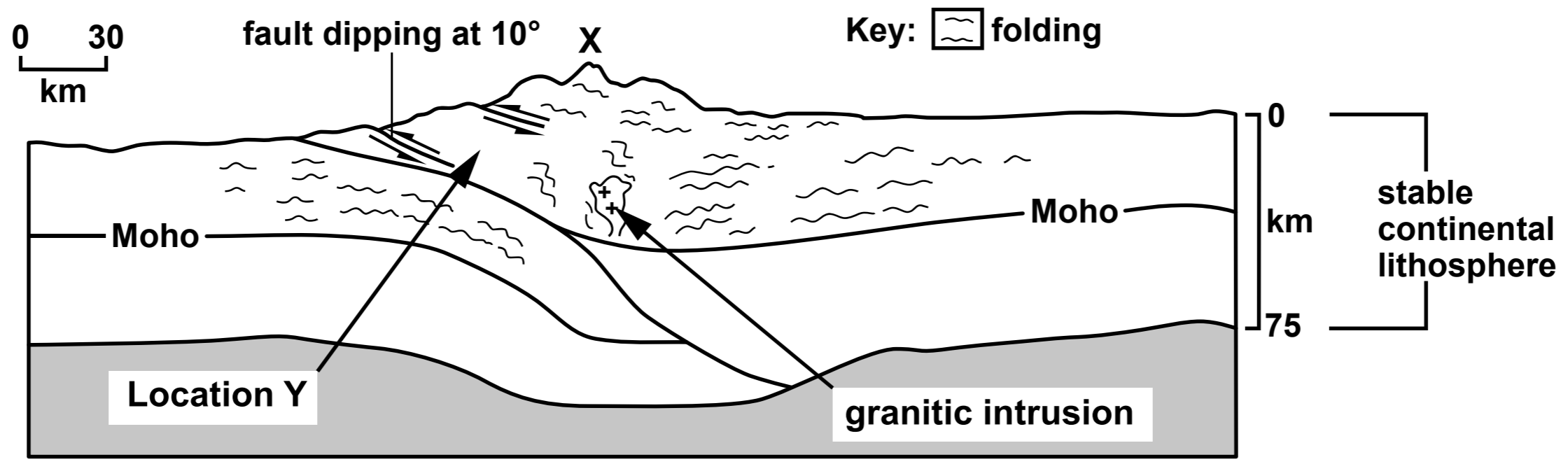
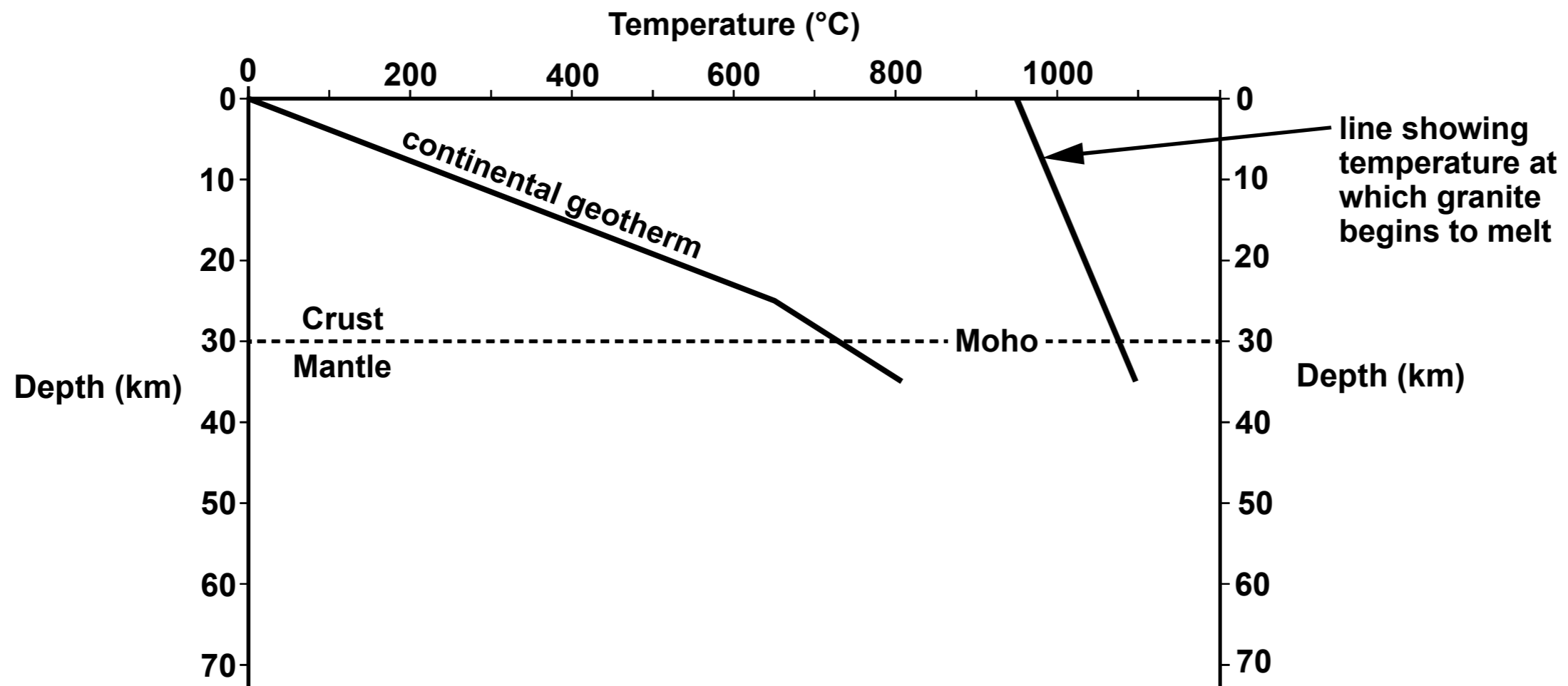


FIGURE 3b



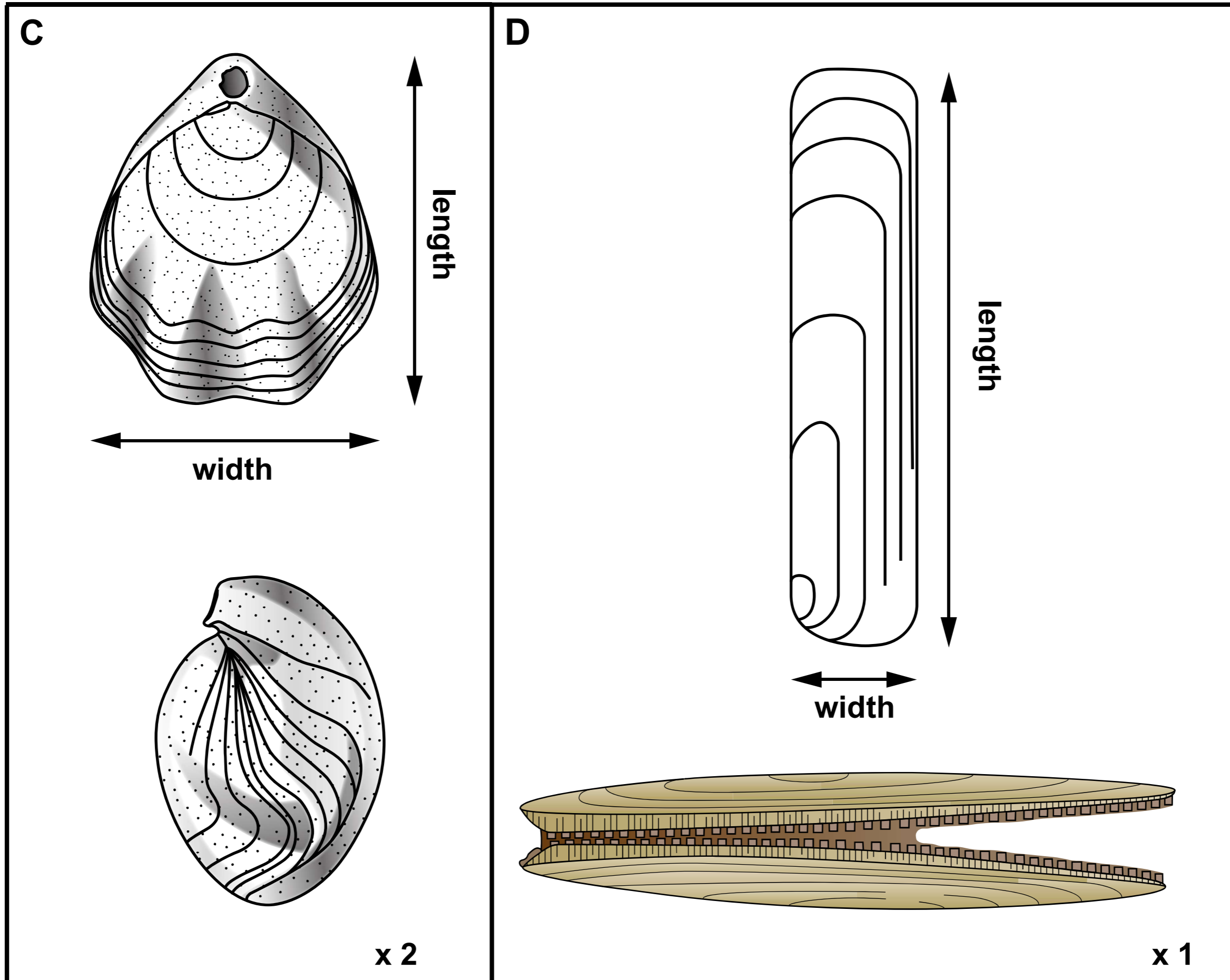
**FIGURE 3C**



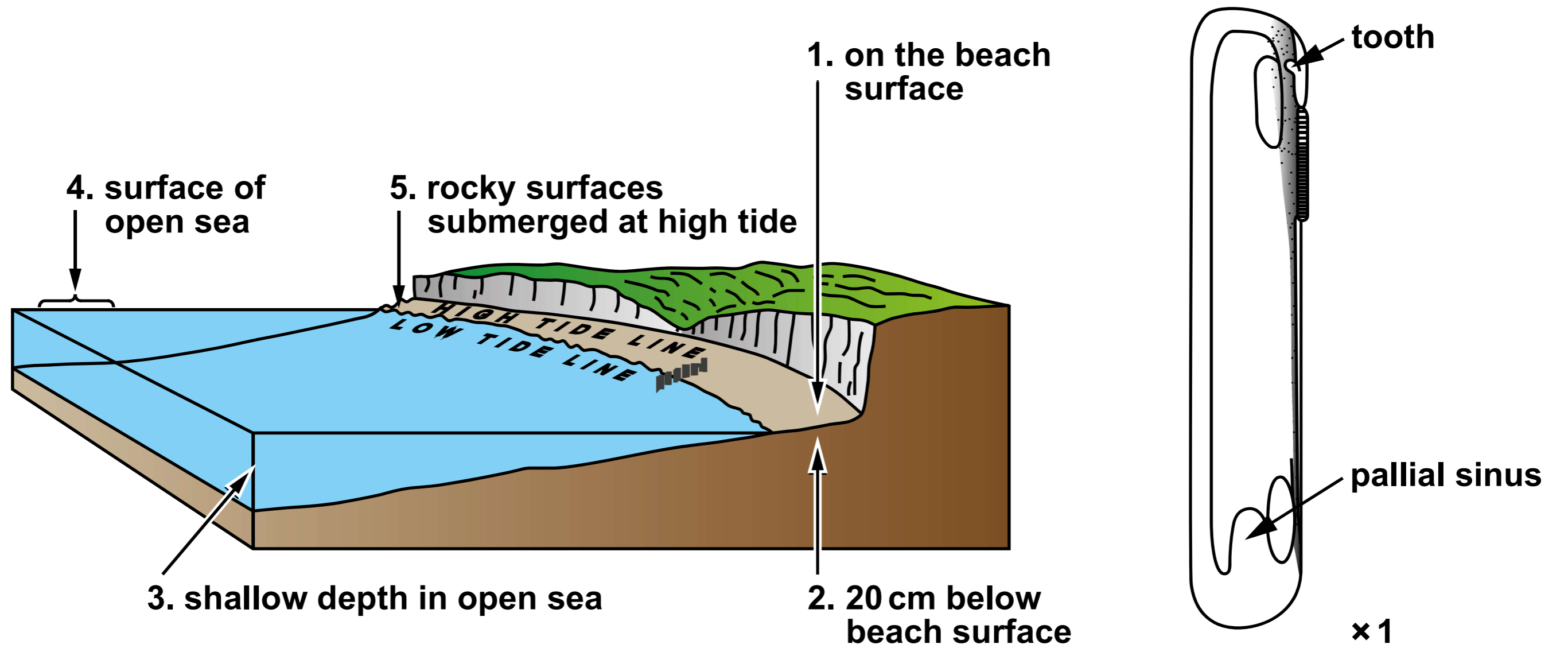
**cleavage  
planes**

0 5  
cm

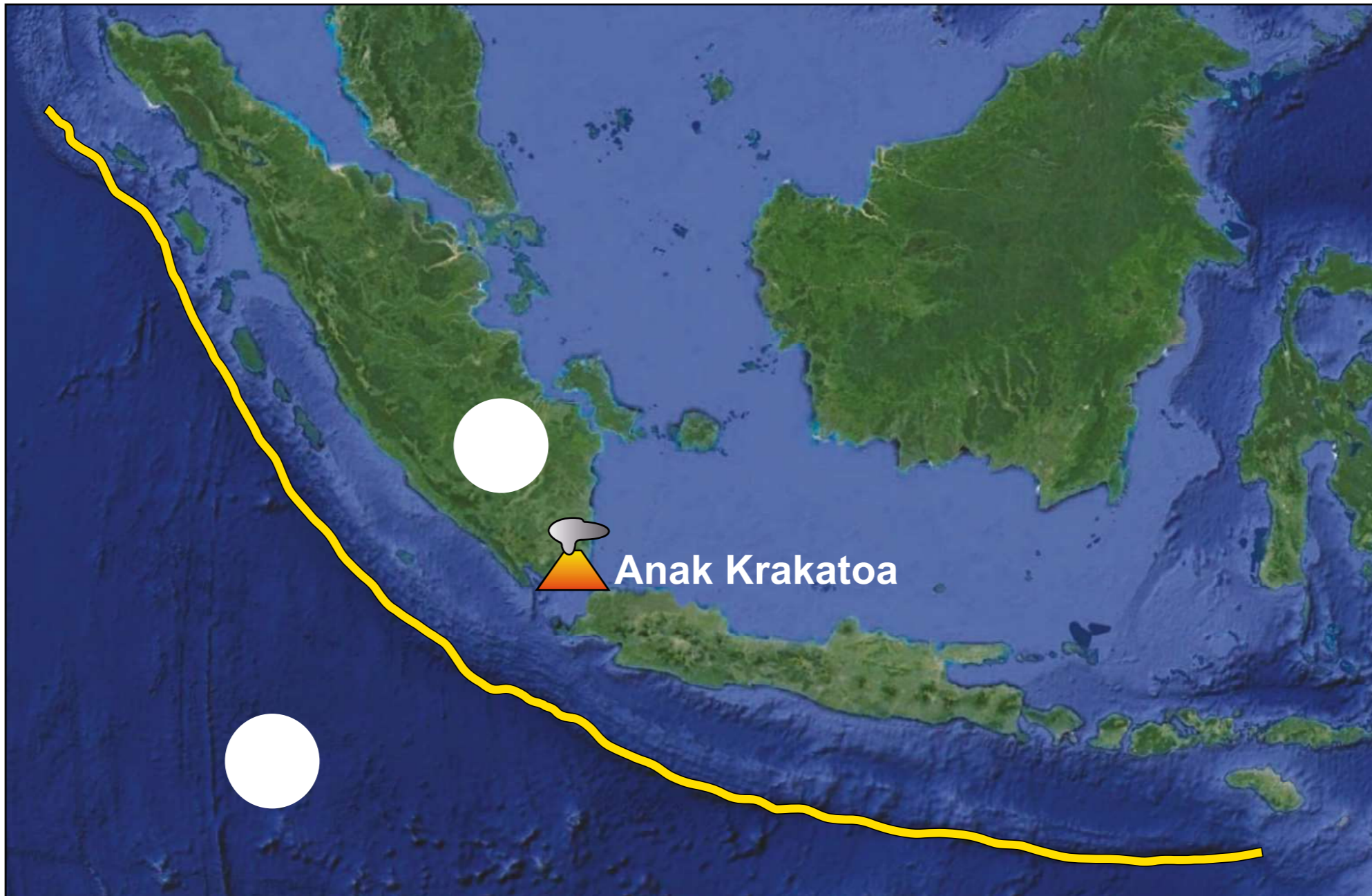
FIGURE 4a



**FIGURE 4b**



**FIGURE 5a**



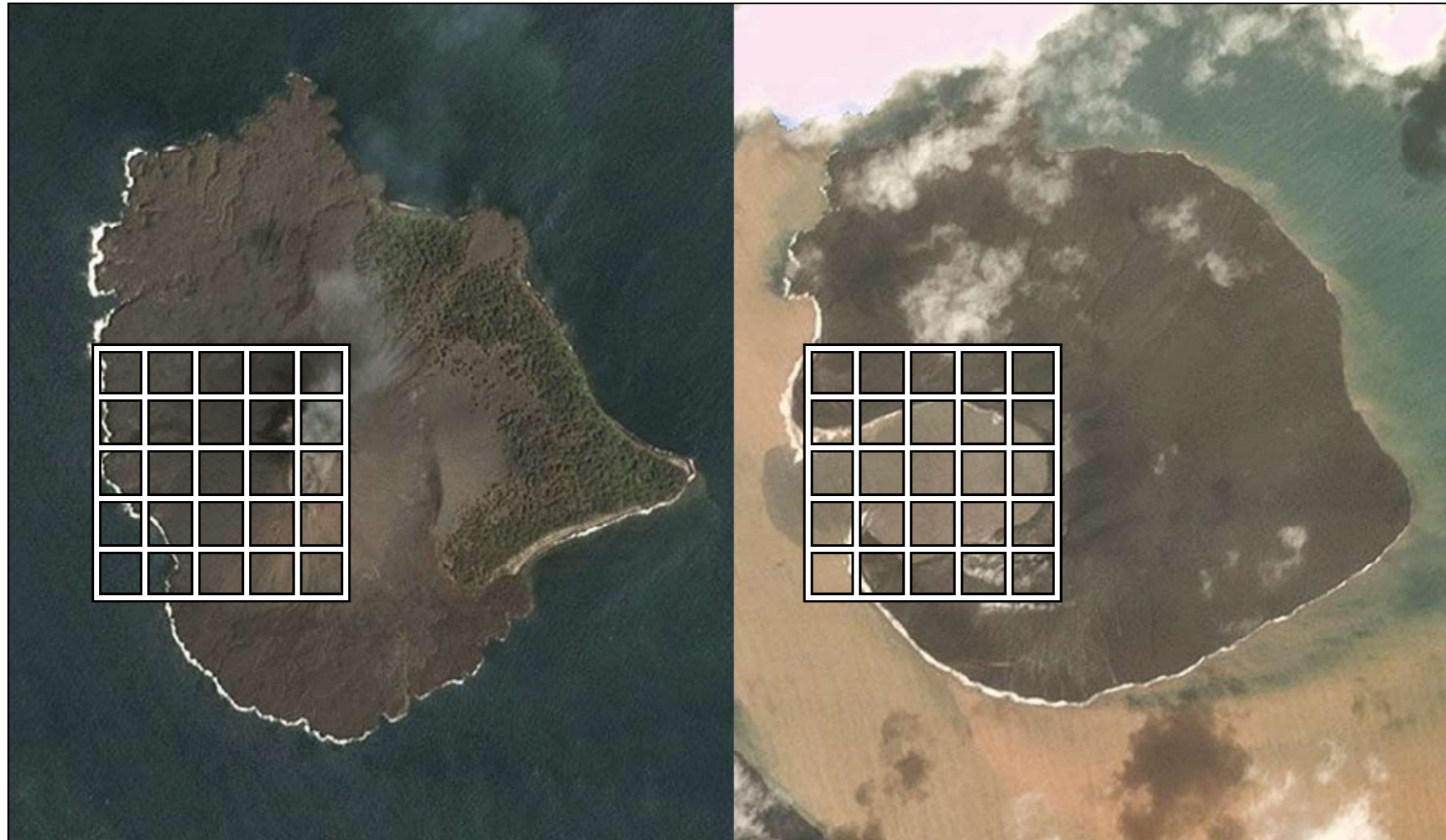
**Key**  
ocean trench



**Anak Krakatoa**

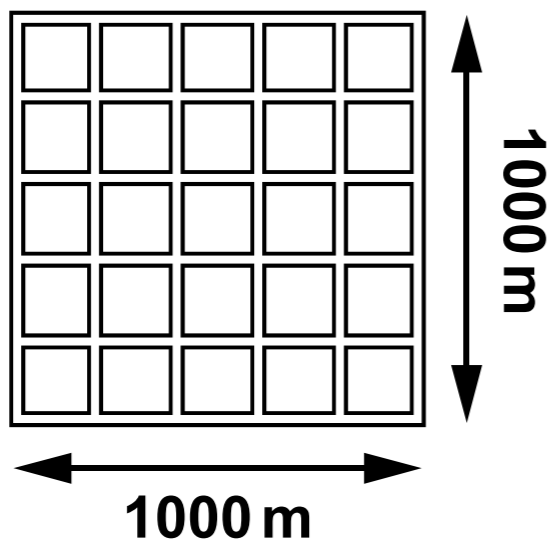


**FIGURE 5b**

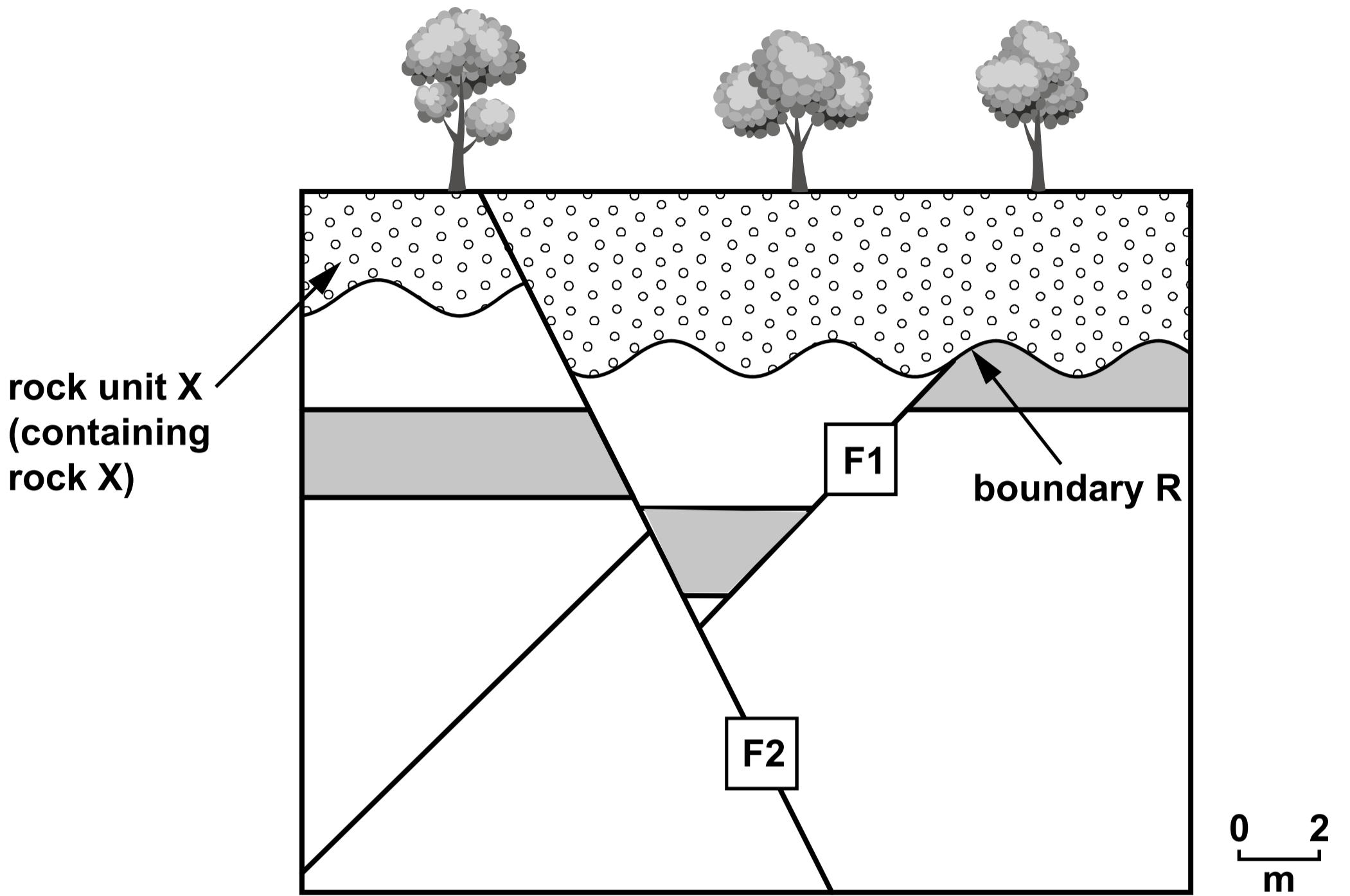


**BEFORE**

**AFTER**



**FIGURE 6a**



**FIGURE 6b**

