



GCSE - NEW

C480U20-1A

GEOLOGY – Component 2

Investigative Geology

FRIDAY, 24 MAY 2019 – MORNING

MAP EXTRACT



GCSE - NEW

C480U20-1

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1 hour 30 minutes plus your additional time allowance

Surname

Other Names

Centre Number

Candidate Number

0

ADDITIONAL MATERIALS

In addition to this examination paper you will need Map 1, the Data Sheet, a protractor and 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 on the previous page.

Answer ALL questions.

Write your answers 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.

Plain paper may be obtained from the supervisor on request.

The assessment of the quality of extended response (QER) will take place in question 3.

Answer ALL questions.

- 1 (a) A student measured the maximum dimension of 100 crystals in**

ROCK UNIT A on MAP 1.

The results have been recorded in TABLE 1a.

TABLE 1a

Crystal Size (mm)	Frequency
0 – 1.9	0
2 – 3.9	15
4 – 5.9	85
6 – 7.9	0
8 – 9.9	0

- (i) Using the information in TABLE 1a, complete FIGURE 1a opposite to show the texture of ROCK UNIT A. [3]**

1 (a)(ii)

State the name of the crystalline texture shown by ROCK UNIT A. [1]

(iii) Explain how the texture of ROCK UNIT A has been formed. [2]

- 1 (b) FIGURE 1b opposite is a photograph of ROCK UNIT B taken at LOCALITY 1 on Map 1. TABLE 1b shows the result of an analysis of 50 crystal orientations found in ROCK UNIT B at LOCALITY 1.**
- (i) Complete TABLE 1b opposite to record the orientations of the crystals circled on FIGURE 1b. [2]**

1 (b)(ii)

Using the data provided in TABLE 1b, complete the rose diagram in FIGURE 1c opposite. [2]

1 (b)(iii)

Using evidence from the completed FIGURE 1c, state the most likely direction in which the magma flowed. Give reasons for your answer. [3]

Direction

Reasons

1 (c) Refer to FIGURE 1b only. State the name of the rock making up ROCK UNIT B.

Give TWO reasons for your answer. [3]

Name _____

Reason 1

Reason 2

**1 (d) Refer to MAP 1 only.
State ONE difference and ONE similarity
between the igneous bodies forming
ROCK UNIT A and ROCK UNIT B on MAP 1.**

[2]

Difference

Similarity

1 (e) State the types of igneous bodies forming
ROCK UNIT A and ROCK UNIT B on MAP

1.

[2]

A

B

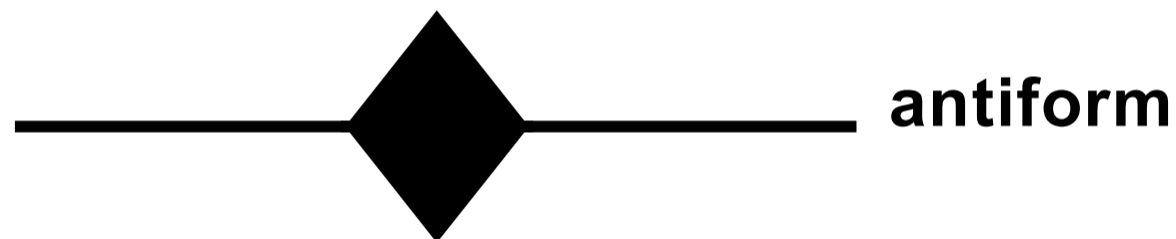
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2 FIGURE 2a opposite is a partly completed geological cross-section along line X-Y on MAP 1.

(a)(i) Complete the cross-section FIGURE 2a along the line X-Y. Draw the boundaries between the different rock units.

Use similar ornament or letters for these, as on MAP 1. [4]

(ii) Draw and label the fold axis on FIGURE 2a, using one of the following symbols. [2]



2 (a)(iii)

ROCK UNIT B was intruded at a temperature of 800°C . Metamorphism starts at 200°C . If the rate of temperature change across a metamorphic aureole is 6°Cm^{-1} , calculate the width of the metamorphic aureole.

Show your working. [2]

_____ m

(iv) Mark on **FIGURE 2a**, the edge of the metamorphic aureole formed by **ROCK UNIT B**.
[1]

2 (a)(v)

A dip and strike measurement was taken at LOCALITY 2 on MAP 1.

Using MAP 1 and FIGURE 2a, complete TABLE 2a below. [3]

TABLE 2a

strike directions	•
dip angle	•
dip direction	•

2 (b) FIGURE 2b opposite is a microscope view of ROCK UNIT G, which only contains mineral P.

It was collected from LOCALITY 3 on MAP 1.

(i) Complete TABLE 2b using information in FIGURE 2b. [4]

TABLE 2b

mean size of crystals (mm)	•
name of mineral P	•
rock group (igneous, sedimentary or metamorphic)	•
name of rock at LOCALITY 3	•

2 (b)(ii)

With reference to MAP 1 and FIGURE 2b, explain the evidence that suggests that ROCK UNIT H forms a sill rather than a lava flow. [3]

2 (c) For each of the pairs of rocks, or geological features given below, state where possible which is older and give your reasons. [4]

The fault and ROCK UNIT B.

ROCK UNIT A and ROCK UNIT B.

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- 3** **FIGURE 3a** opposite is a partly completed sedimentary log recorded within **ROCK UNIT E** at **LOCALITY 4** on **MAP 1**.

TABLE 3 describes the sedimentary characteristics of the rocks within beds 1 - 6 of the sedimentary log.

- (a) Complete **FIGURE 3a** by adding beds 3, 4 and 5 using the descriptions in **TABLE 3**. [3]

TABLE 3

BED NUMBER	DESCRIPTION
6	10 m thick bed of limestone with corals
5	12m thick bed which has a medium grain size. FIGURE 3b shows structures found in bed 5
4	8m thick bed of conglomerate with an erosional base
3	18 m thick bed of black shale
2	12m thick bed with an erosional base; it has a medium grain size at the base, grading into fine at the top
1	10 m thick bed of black shale

3 (b) FIGURE 3b opposite shows a sedimentary structure found on the upper surface of bed 5.

State the name of the sedimentary structure in FIGURE 3b and explain how it forms. [3]

Name _____

Explanation

- 3 (c) FIGURE 3c opposite is a photograph of a fossil collected from bed 1.**
- (i) Complete FIGURE 3d opposite by drawing the fossil shown in FIGURE 3c. Measure and draw the fossil using the scale provided. [3]**
- (ii) Label a theca on FIGURE 3d. [1]**
- (iii) State the name of the fossil group shown in FIGURE 3c. [1]**
-

4 FIGURE 4a opposite is a cliff face that cuts through a small fault in the area shown on MAP 1.

(a) Refer to FIGURE 4a.

(i) In FIGURE 4b opposite draw to scale, the main geological features shown in FIGURE 4a. [5]

(ii) On your drawing in FIGURE 4b label the downthrown side of the fault. [1]

(iii) Using FIGURE 4a measure the displacement along the fault. [1]

4 (b) State the type of stress that formed the fault in FIGURE 4a.

Give reasons for your answer. [3]

Type of stress

Reasons

10

5 **FIGURE 5a** opposite shows mineral **Q** which was collected from **LOCALITY 5** on **MAP 1**.

Mineral Q is the only mineral forming **ROCK UNIT D**.

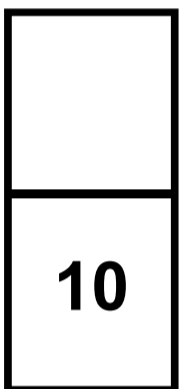
continued on the following page

5 (a)(i)

Complete TABLE 5 opposite which refers to tests MOST USEFUL for identifying mineral Q in FIGURE 5a. [5]

You may wish to refer to the Data Sheet.

(ii) State the name of the rock forming ROCK UNIT D. [1]



END OF PAPER

Acknowledgement

Figure 4a

<http://www.pitt.edu/~cejones/Geolimages/7structures>

FIGURE 1a

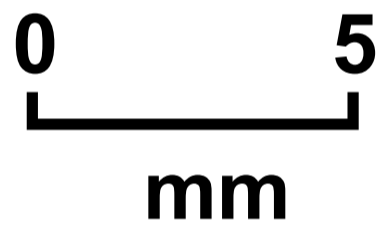
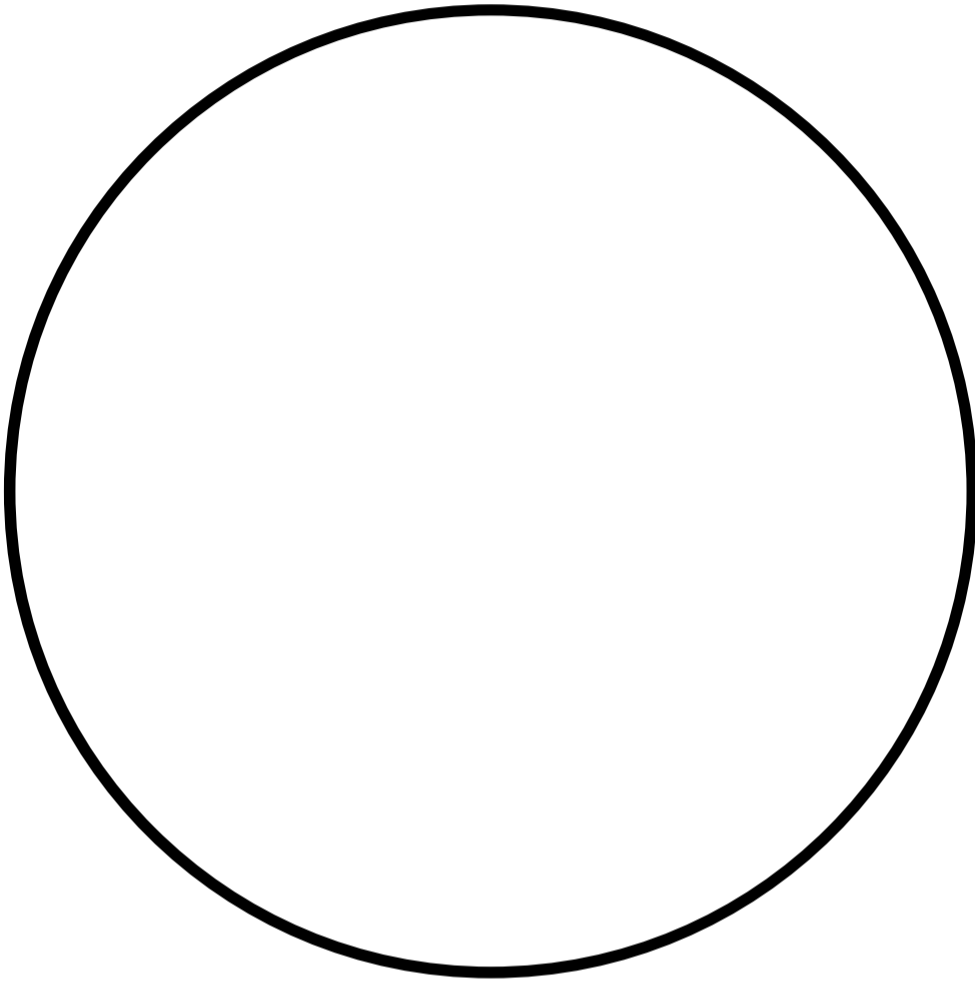


FIGURE 1b

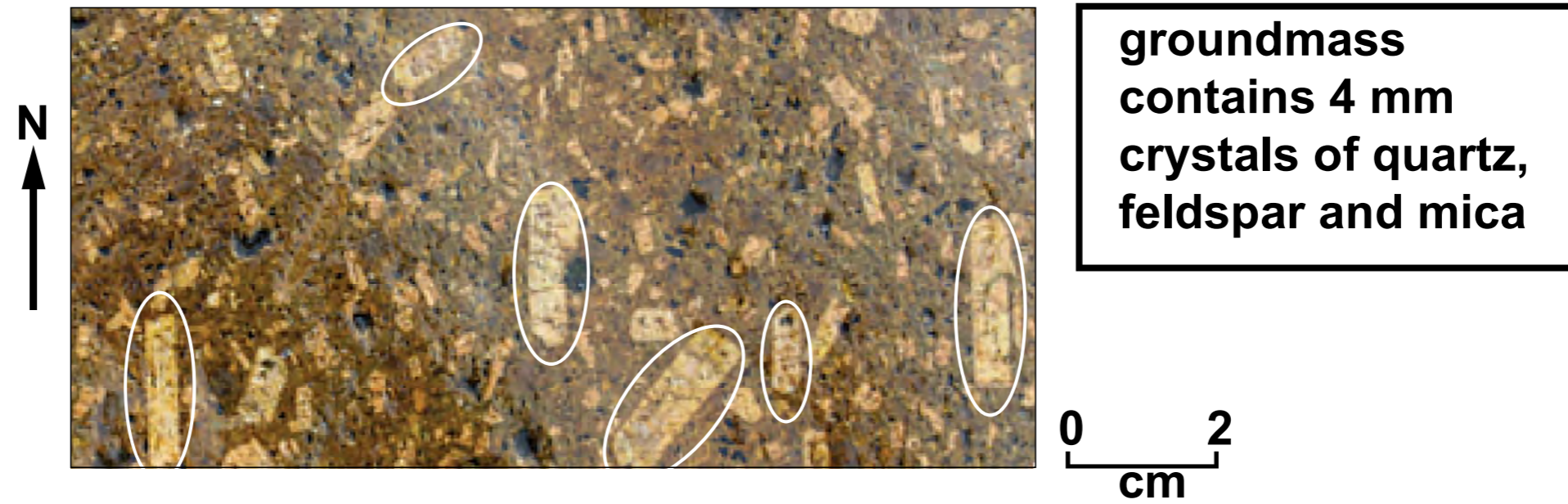


TABLE 1b

NW – SE		N – S		NE – SW		E – W	
total	30	total	•	total	•	total	•

FIGURE 1c

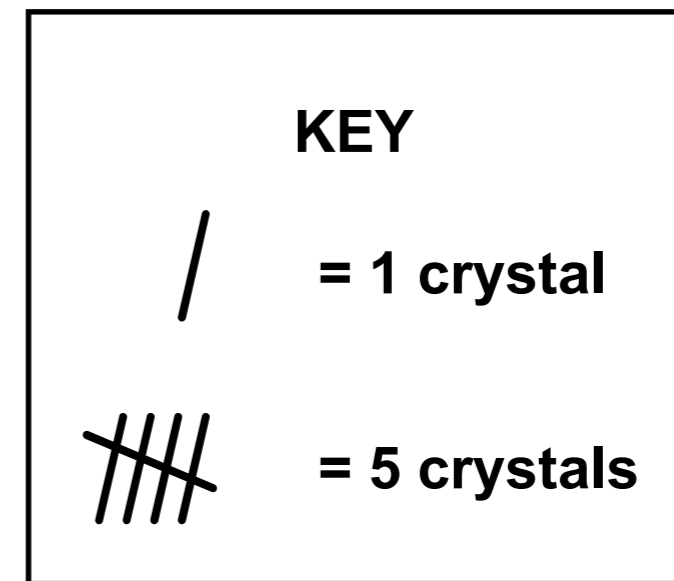
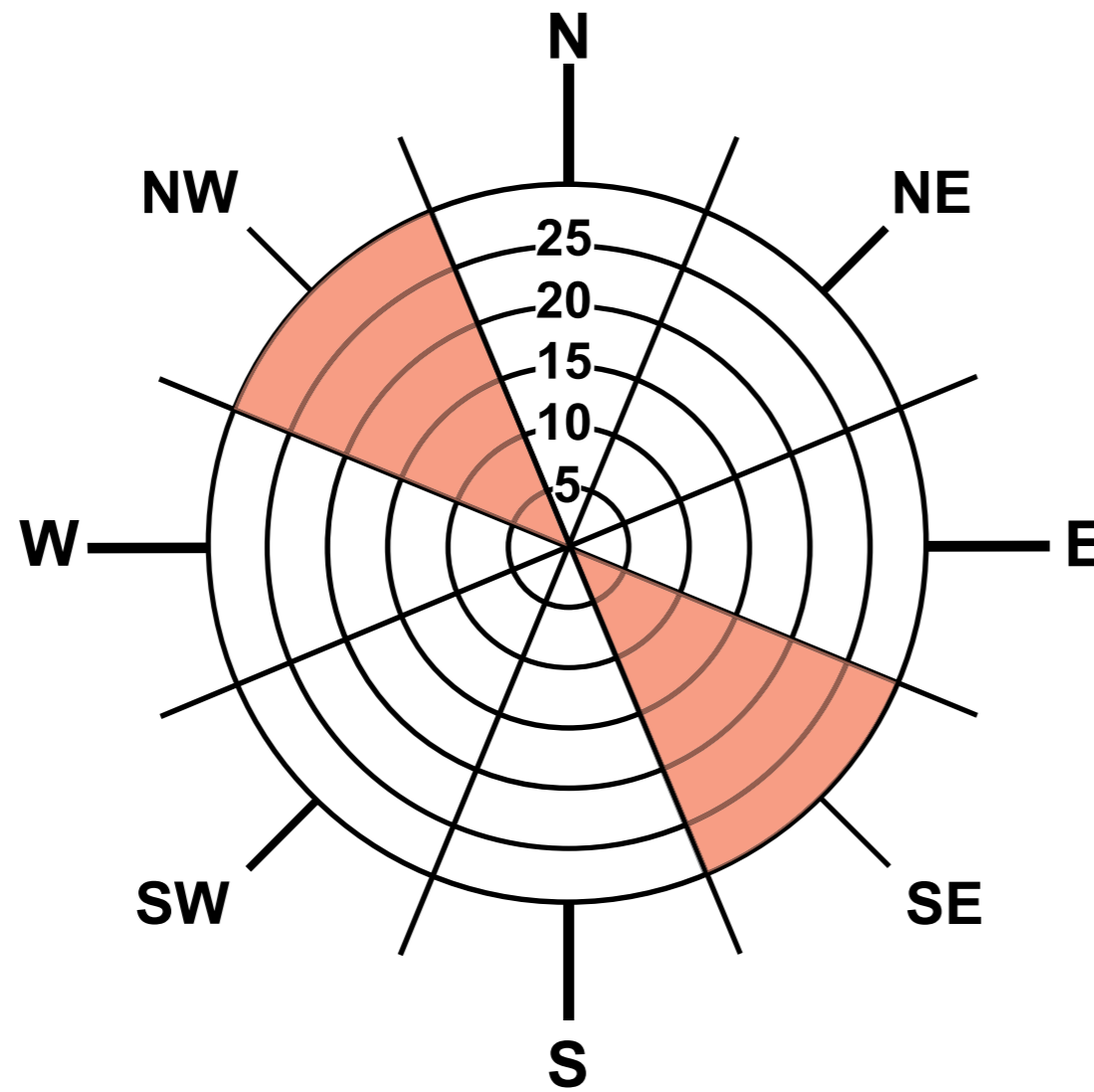


FIGURE 2a

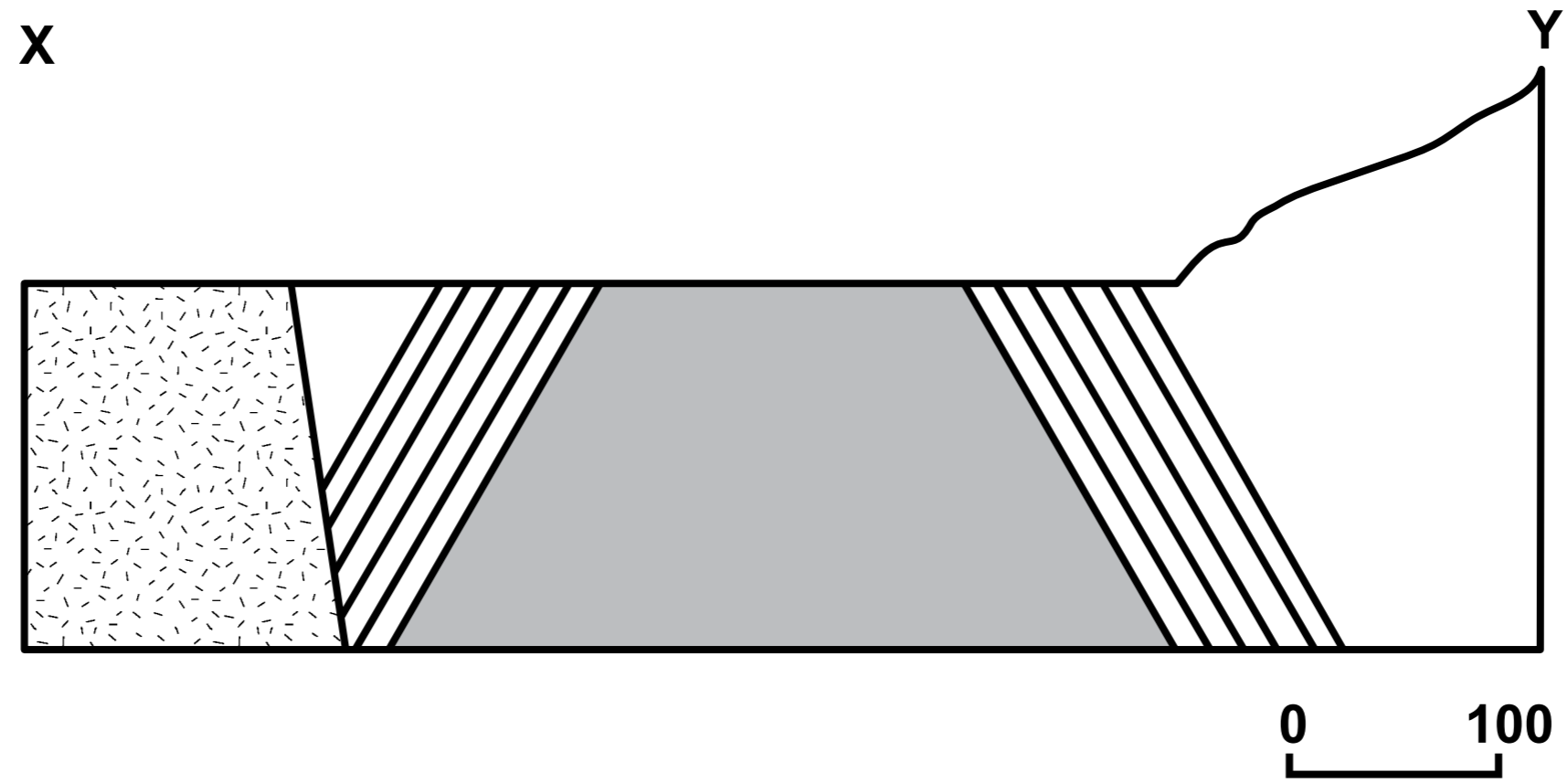


FIGURE 2b

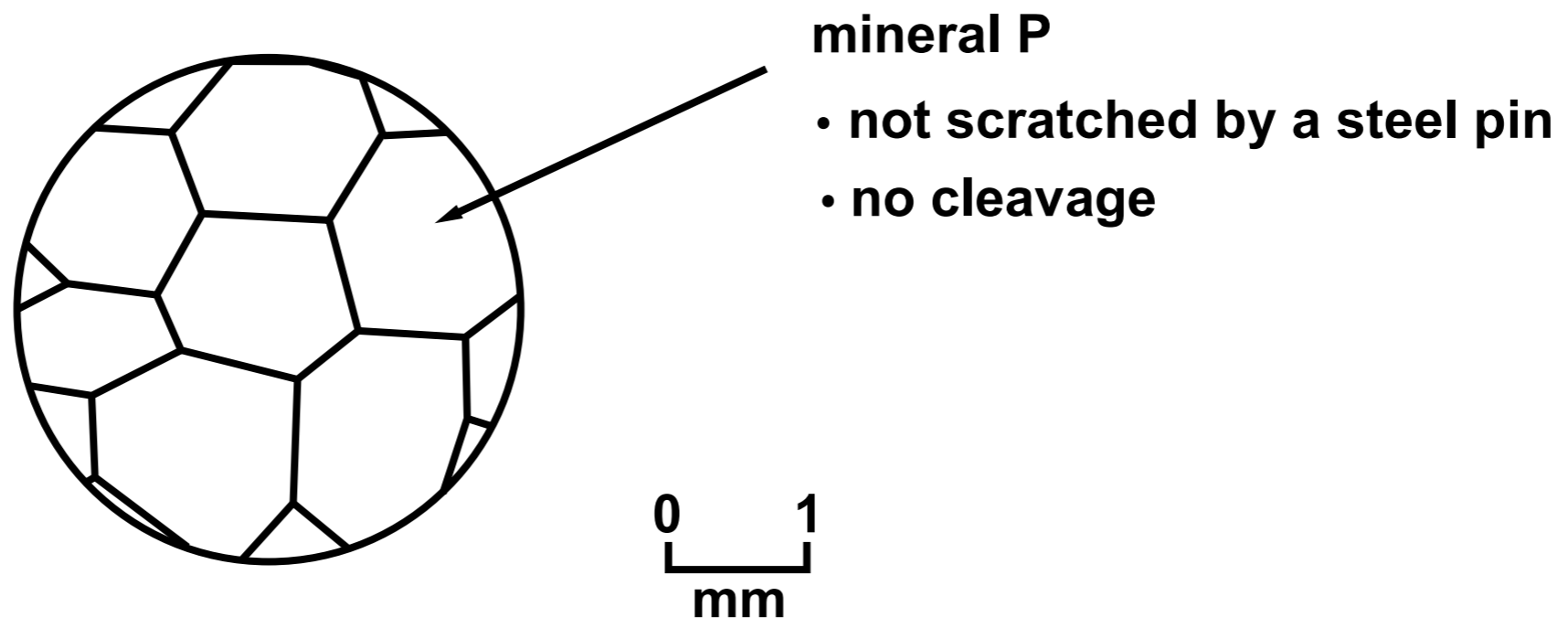


FIGURE 3a

metres

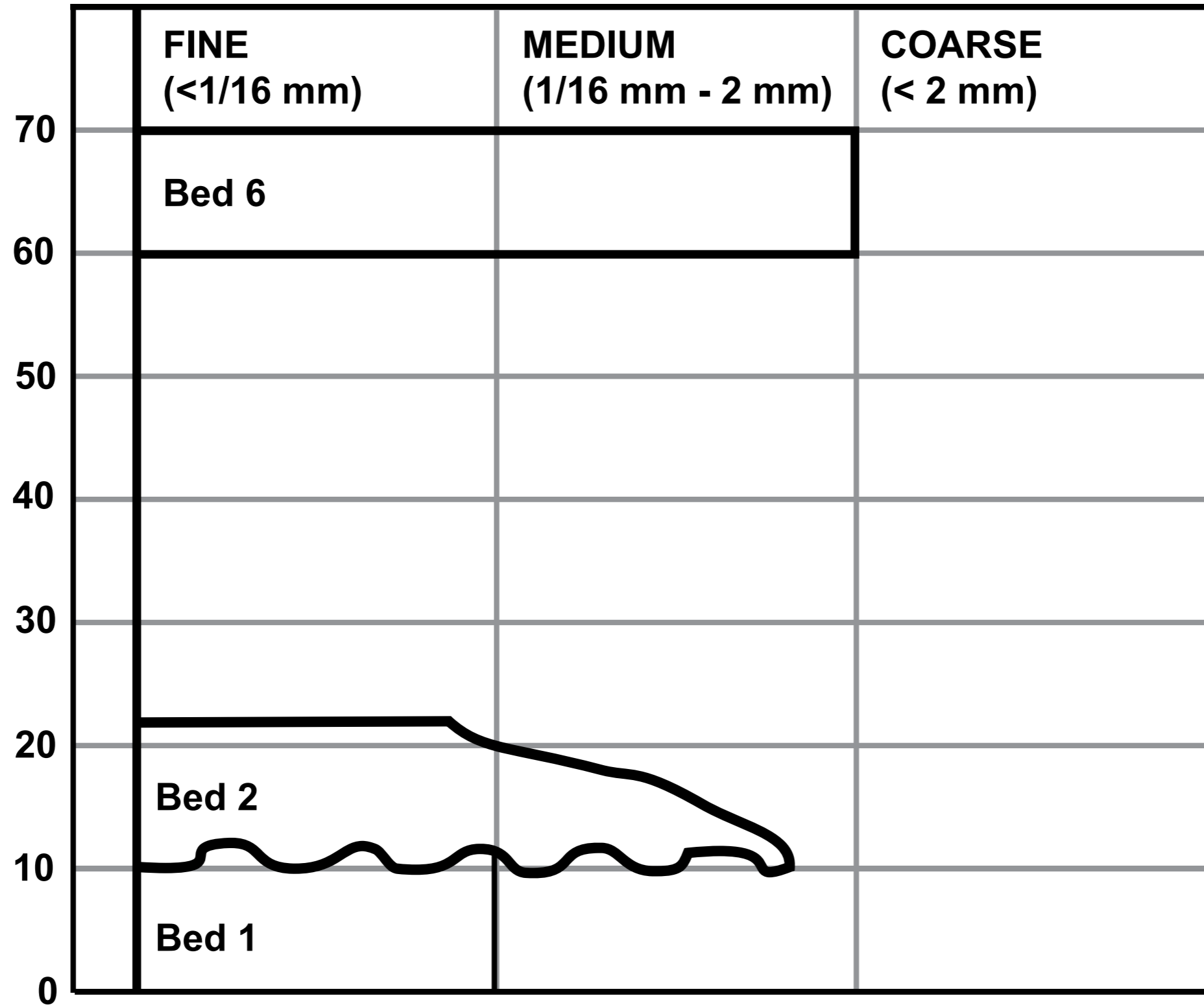


FIGURE 3b



0 50
cm

FIGURE 3c



scale x 1

FIGURE 3d

scale x 2

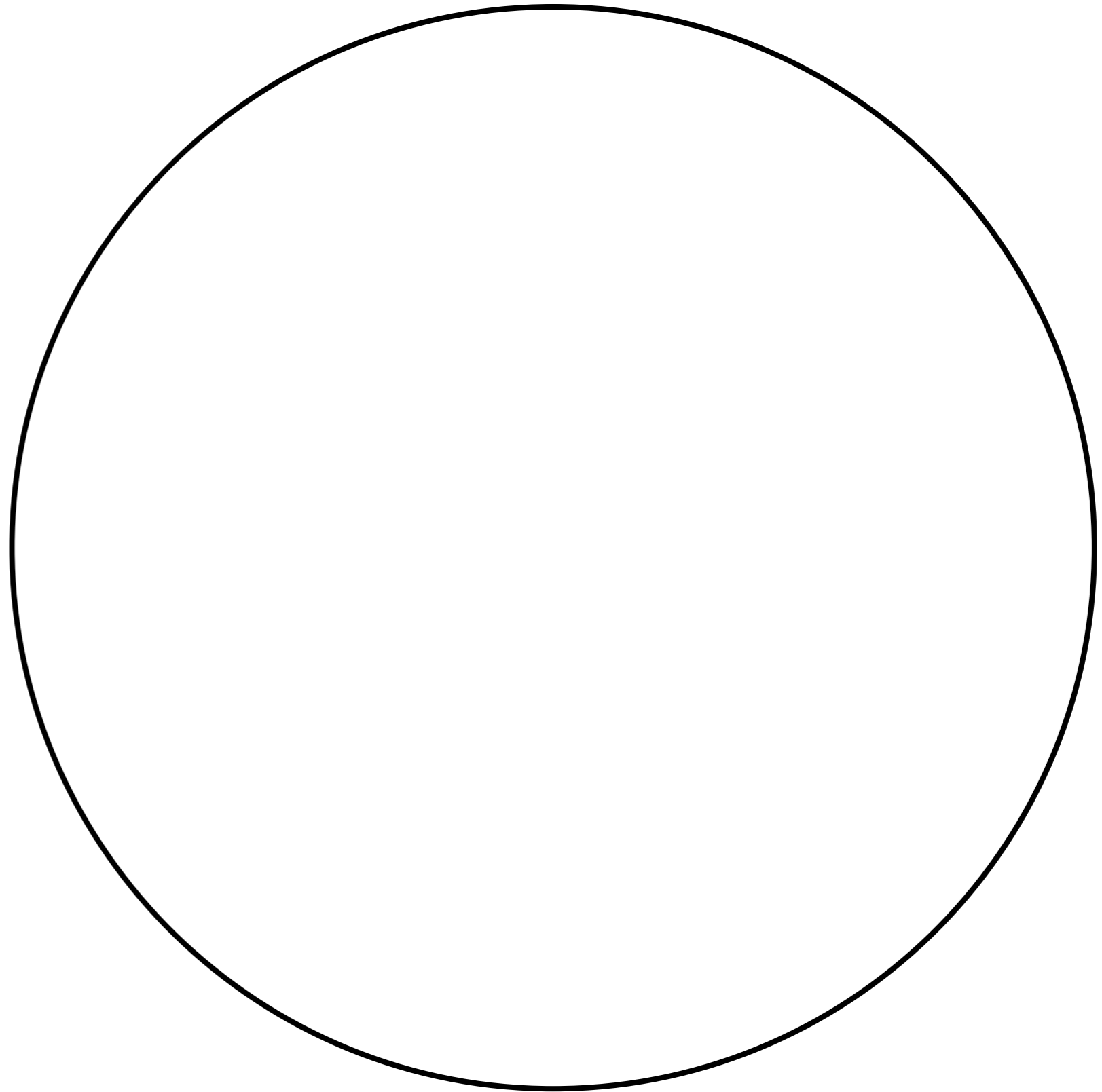
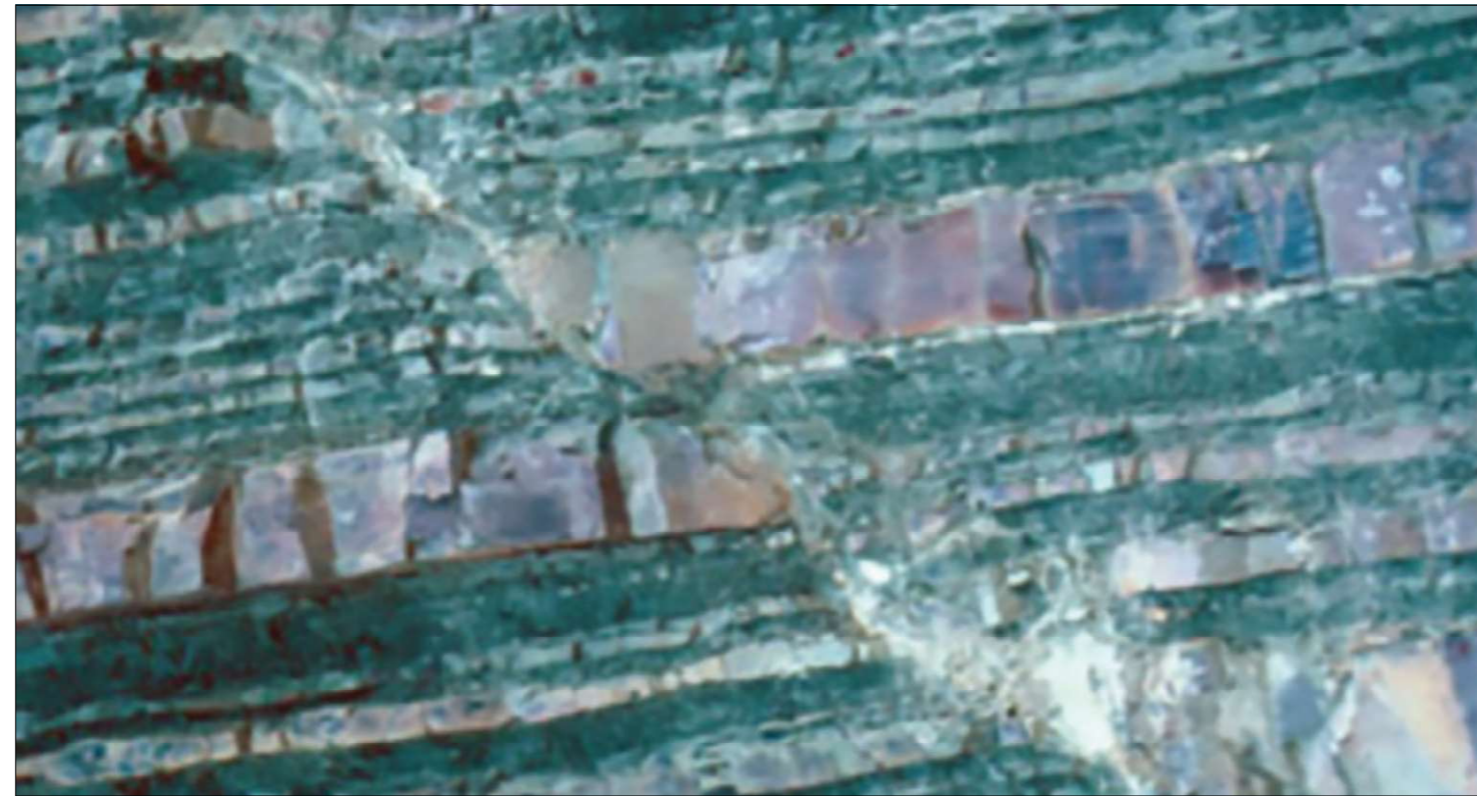


FIGURE 4a

North

South



0 1
m

FIGURE 4b



0 1
m

FIGURE 5a

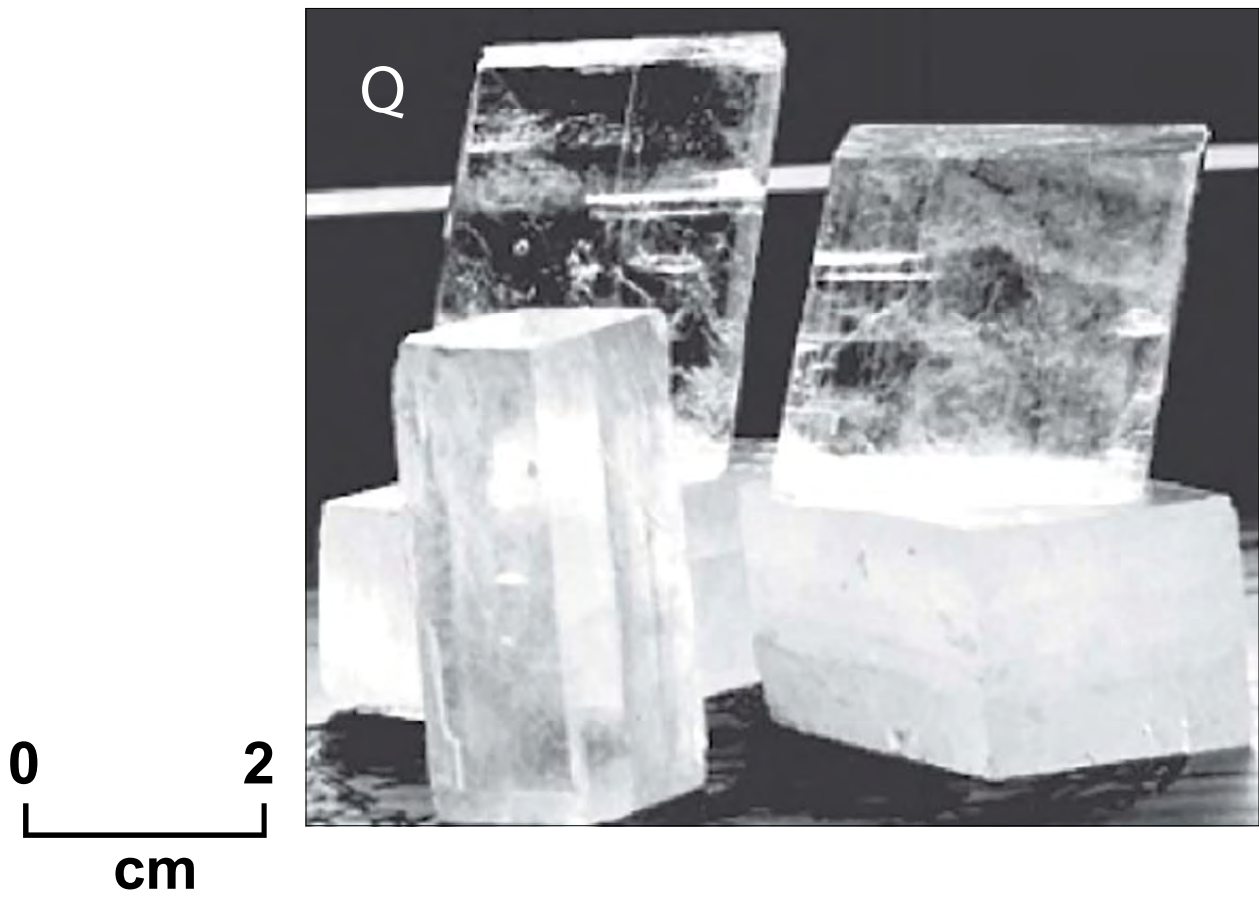
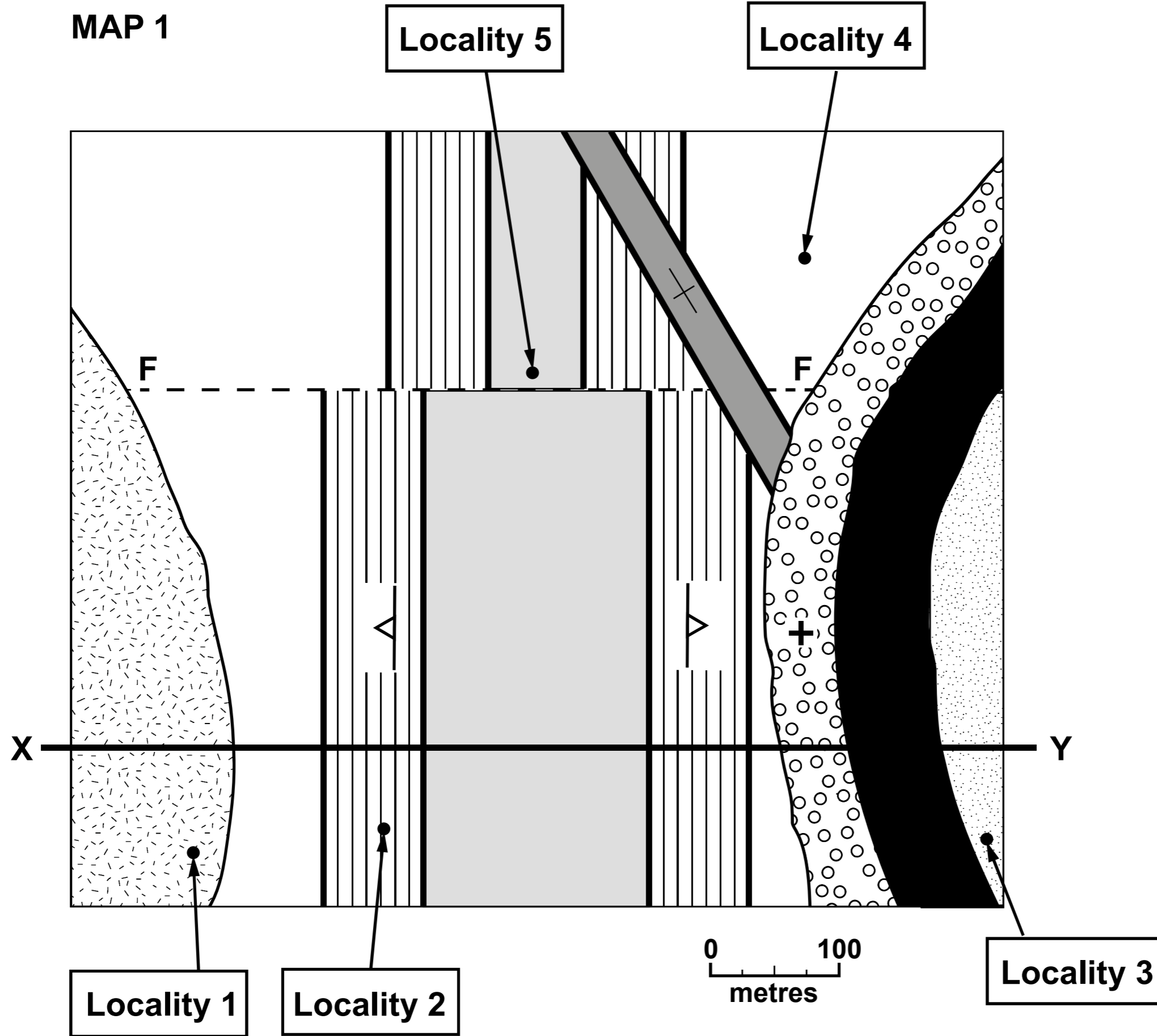


TABLE 5

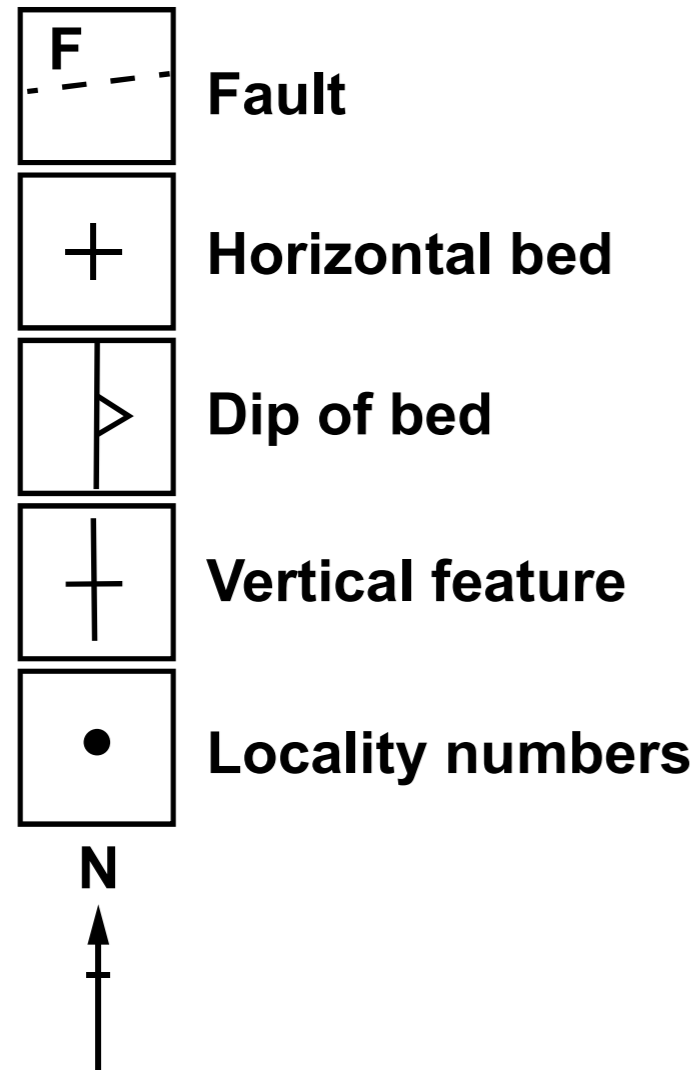
Test name	Description of test	Result of test
colour	observe mineral in natural light	white to colourless
•	•	effervesces giving off CO₂
•	Look for regular planes of weakness	•
hardness	•	hardness is between 3.5 and 2.5 on Mohs hardness scale

MAP 1



MAP 1

The rock units are not in order of age.
Their ornament is not necessarily representative
of rock type.



	Rock Unit A
	Rock Unit B
	Rock Unit C
	Rock Unit D
	Rock Unit E
	Rock Unit F
	Rock Unit G
	Rock Unit H (basalt)



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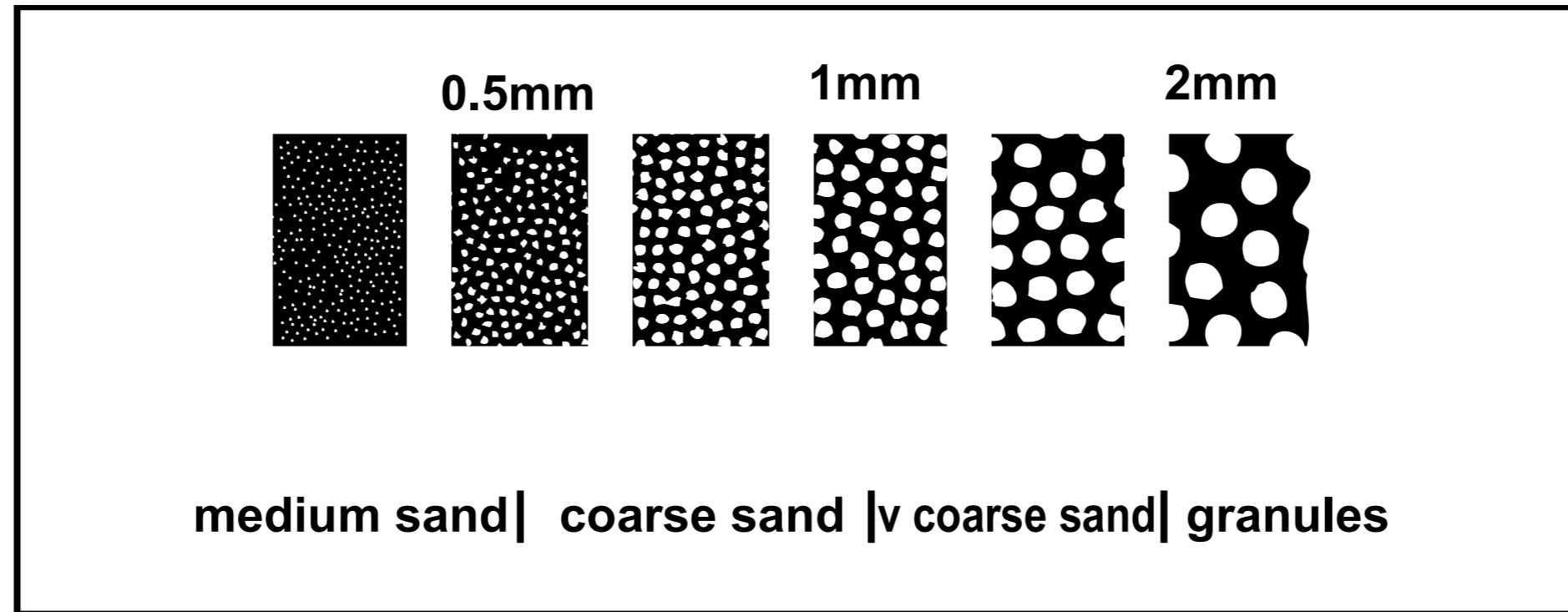
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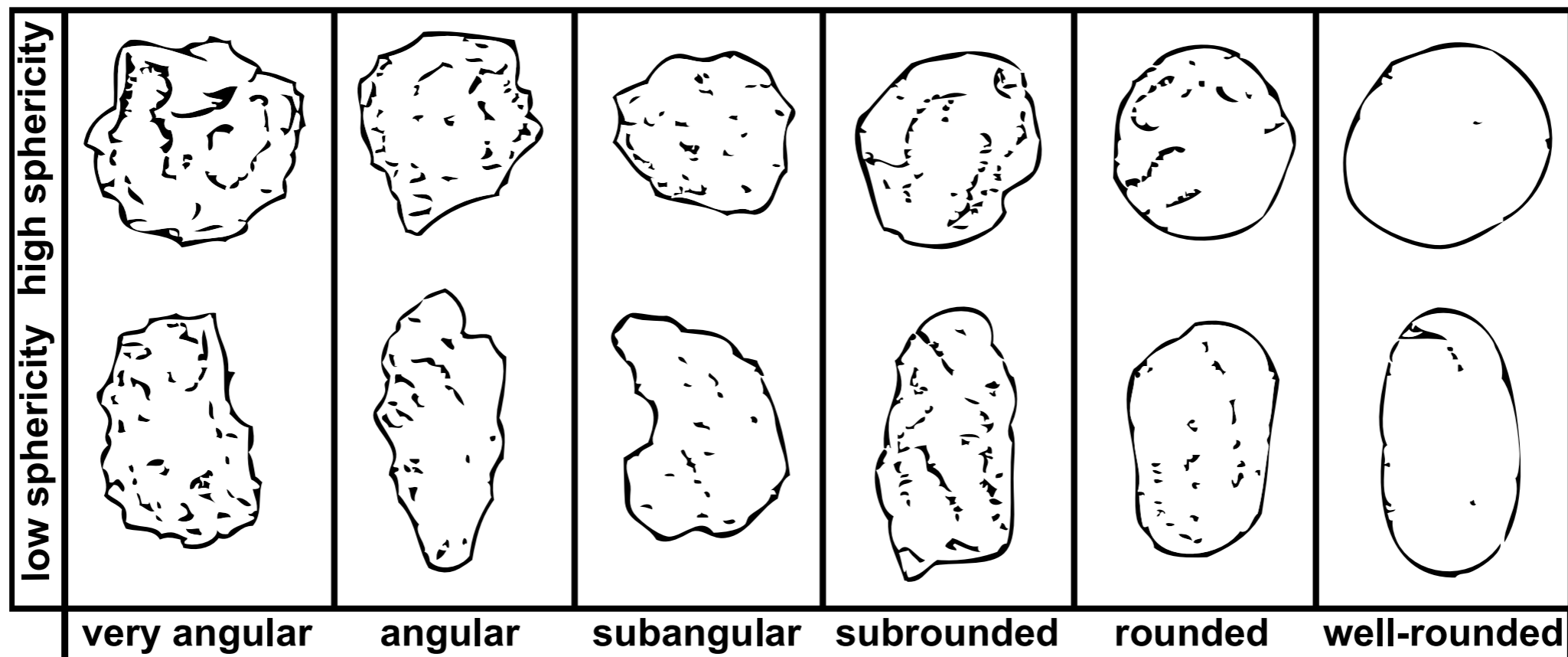
DATA SHEET

FRIDAY, 24 MAY 2019 – MORNING

GRAIN SIZE SCALE



GRAIN SHAPE AND SPHERICITY SCALE



MOHS' SCALE OF HARDNESS		
Mineral/ hardness		Common equivalent
Diamond	10	
Corundum	9	
Topaz	8	
Quartz	7	
Orthoclase feldspar	6	← steel pin
Apatite	5	
Fluorite	4	
Calcite	3	← copper coin
Gypsum	2	← finger nail
Talc	1	

PHYSICAL PROPERTIES OF MINERALS IN HAND SPECIMEN

NAME	HARDNESS (MOHS' SCALE)	TYPICAL COLOUR	STREAK	LUSTRE	CLEAVAGE (NUMBER OF DIRECTIONS)
Quartz	7	colourless or white	scratches streak plate	glassy	none
Feldspar	6	white	scratches streak plate	pearly to glassy	2 good
Mica	2½	silvery or brown	white	pearly to glassy	1 good
Augite	5½	black	scratches streak plate	glassy	2 good
Olivine	6½	green	scratches streak plate	glassy	none
Halite	2½	white	white	glassy	3 good
Calcite	3	white	white	glassy	3 good
Haematite	5½	black or red-brown	red-brown	metallic or dull	none
Galena	2½	grey	grey	metallic	3 good
Garnet	7	red	scratches streak plate	glassy	none

GEOLOGICAL RANGES OF VERTEBRATES

