FIELDWORK EXERCISE – CHURCH QUARRY SJ [illegible] ? 1974

'O' LEVEL

(a) Assumptions. The ability to use compass and clinometer after training in school on sloping desks. Cheap orienteering compasses are splendid. This exercise is to be attempted no earlier than the first six months of an O level course. Other simpler pupil investigations will have been attempted from the very first field trip outside school. This might form the third trip. The exercise assumes no more than an introductory knowledge of the nature of rocks and a climate in which geological curiosity and commitment to do and act are second nature.

(b) Needs for each pupil. Clipboard, pencils, plastic ruler, lens, rubber, compass, clinometer, measuring tape, penknife, copper coin, fingernails, weak acid and any other preferred testing apparatus.

(c) The worksheet.

(i) Time allowed 1½ hours.

(ii) General instructions. Work neatly in pencil, trying to be as precise as possible. Work individually. Rely on and develop your own initiative. This is an exercise to train and develop your powers of investigation. In most places there is no need to hammer rocks. If you see something which is not mentioned in the worksheet, record the data in words or in symbols – it may be something that no one has seen, measured or understood before. Good hunting!

(iii) Procedure.

1. Locate and orientate yourself by reference to the shape of the quarry and the position of trees, pathways, entrances etc.

2. Mark north on the compass rose.

3. Locate bedding planes (i.e. the likely original horizontal) at the places marked A_1 and A_2 on the map. Measure the present angle of true dip and its direction. Record this in words and numbers here. Dip ... deg. to ...; and plot on your map, being careful to record in the correct manner. What is the direction of strike? Strike ... Record and name a stratum contour on your map. If there are too many colleagues here move on and come back later.

4. Plot the direction of joints at A on your map as carefully as possible. Note the frequency of vertical joints per horizontal metre, their directions and dips. Frequency per m . . . . . Directions . . . . Mean . . . . . . Dips . . . .

5. Describe the rock at B, recording your data on the rock description sheet. Be careful to observe closely with a lens. Write down your conclusion. Is the rock igneous, sedimentary, metamorphic? . . . .

6. Describe the rock at C, recording the data on your rock description sheet.

7. Is the rock igneous, sedimentary, metamorphic? . . . . Write down at least three differences of the rock at C compared with B 1. . . . . 2. . . . . 3. . . . . 4. . . . .

7. Locate rock in place at D. Be careful to find a fresh fracture surface. If needs be chip the edge of a block or find a fresh fragment close by on the scree. Describe the rock at D recording your data on the rock description sheet. Be careful to observe closely with a lens. Is the rock igneous, sedimentary or metamorphic? . . . .

8. Locate rocks in place at E and F. Which is comparable with which rocks at A,B,C,D? E with . . . . . , F with . . . .

9. Locate rock face G. The nature of the rock recalls that seen at which of these places? Underline the comparable localities A B C D E F.

10. Locate rock face H. The nature of the rock recalls that seen at A B C D E F G? Underline.

11. Try to trace the direction and dip of the junction between rocks seen at C-D, D-E, E-F, G-H. Plot actual boundaries in a firm line on your map, predicted boundaries in a dotted line. Mark dips of boundaries carefully on your map.

12. Which rocks originated first: the rocks at A-B-C, or those at D and F?

13. Think about the relationships between these rocks and their boundaries. Write a few sentences on the right of your map to explain your hypothesis of these relationships. After this try to test your hypothesis of the relationship of these rocks by predicting what rocks will appear in what order in the north face of the quarry. Show your predictions by recording the predicted rock boundaries in dotted lines on your map without going across to the north side of the quarry. Go across to the north side of the quarry only after you have handed in your worksheets after doing exercises 13, 14, 15.

14. Write a brief geological history of the events recorded by the rocks in this quarry.

If you finish quickly you may wish to try:

15. Plotting stratum contours at 1 m intervals on your map for a hypothetical bedding plane which outcrops at the top of the quarry at A.

16. Measuring and estimating the maximum thickness (in metres) of rock of type B in the quarry.

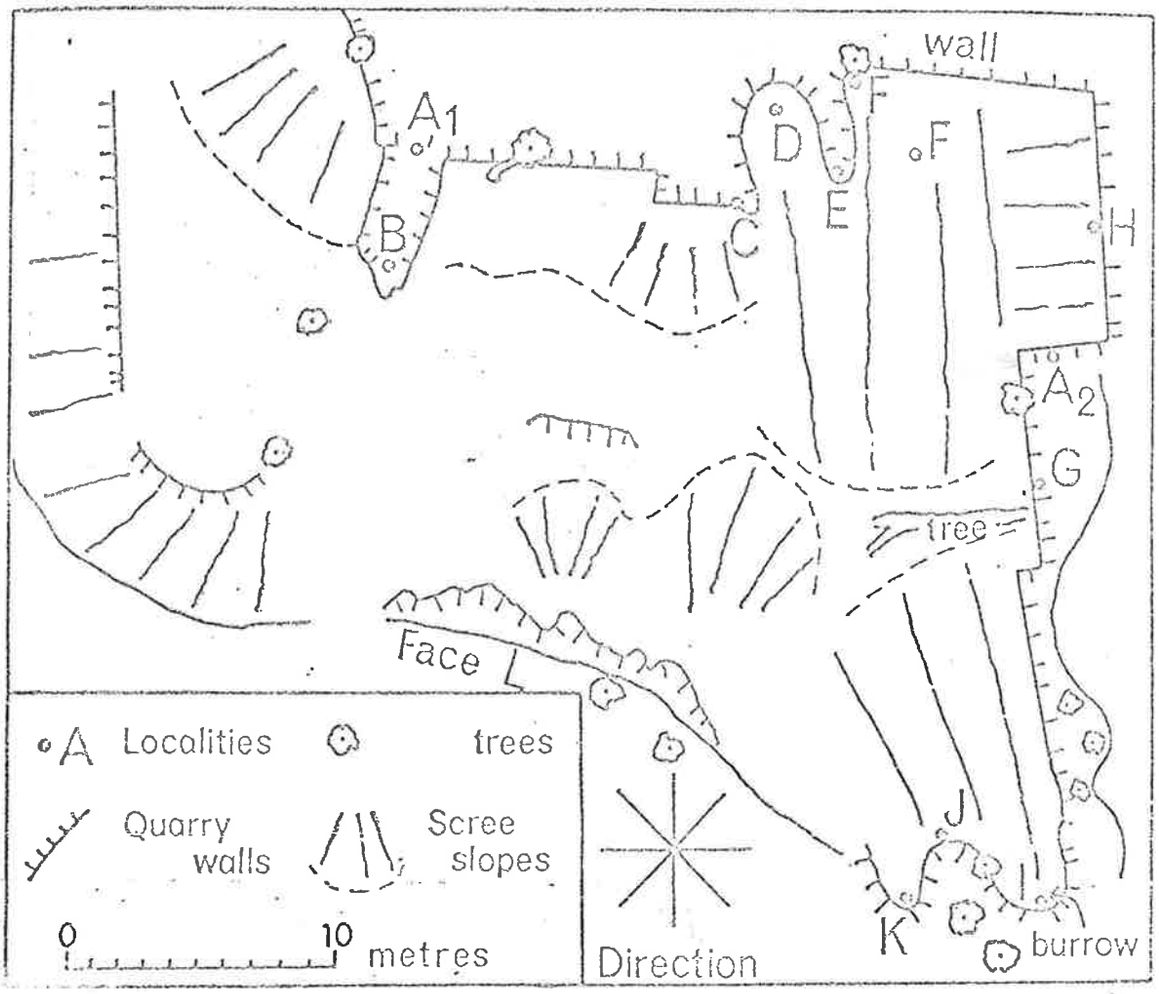
After this, hand in your sheets and then start to look around and investigate the rest of the quarry. Do not talk to others and influence them. You may investigate the cause of the ridge and linear slope relating to this wood but you should not trample down rare flora and fauna in the undergrowth in the woodland. Do not go out of hailing distance.

Teachers

Using Bloom's or Gronlund's taxonomy, write down the scientific objectives which you think the compiler of this exercise had in mind.

A ROCK DESCRIPTION CHART FOR USE AT 'O' LEVEL BOTH IN THE LABORATORY AND THE FIELD

FEATURES LOCALITY & ROCK NUMBER	GRAIN SIZE GRAINS MM USE LENS	TEXTURE SORTING ANGULARITY USE LENS	MINERAL COMPOSITION APPROX % CEMENT? (ACID TEST) USE LENS	COLOUR(S)	REASON FOR COLOUR(S)	RELATIVE DENSITY OF ROCK IN HAND	RELATIVE HARDNESS OF ROCK	SOUND & SMELL WHEN STRUCK	STRUCTURES SEEN USE LENS?	FRACTIONAL PROPERTIES	WEATHERING FEATURES	NAME OF ROCK: IGNEOUS, SEDIMENTARY, METAMORPHIC PARTICULAR NAME ..... ENVIRONMENT OF ORIGIN



Church Quarry.