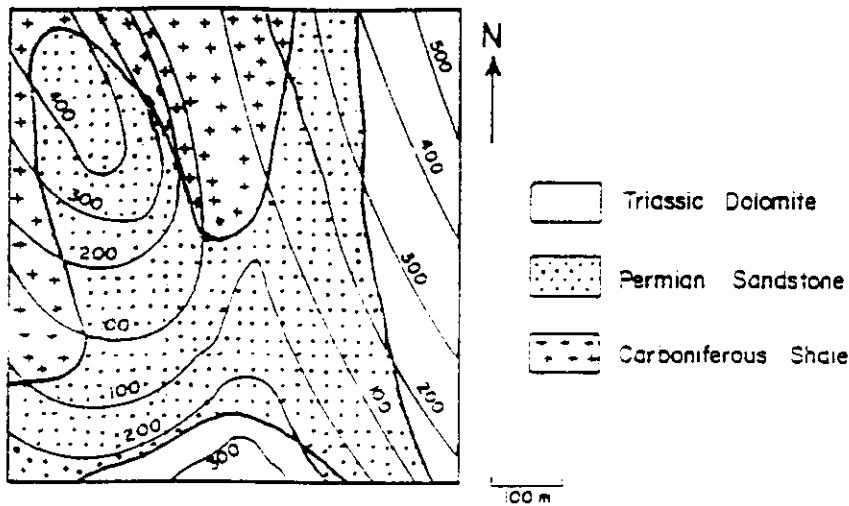


f. The map pattern of an area of symmetrically folded strata which has been cut by a dip-slip fault (southern section downthrown) and eroded.

Section B. (60 marks)

Answer the multiple choice questions on the answer sheet provided. Note that three marks will be given for each correct answer and one mark will be deducted for each incorrect answer.



1. The upper boundary of the sandstone in Figure 1a has which of the following orientations.
 - a. $030^{\circ} - 55^{\circ}$
 - b. $050^{\circ} - 45^{\circ}$
 - c. $210^{\circ} - 40^{\circ}$
 - d. $230^{\circ} - 45^{\circ}$
 - e. $050^{\circ} - 20^{\circ}$

2. The lower boundary of the sandstone in Figure 1a has which of the following orientations
 - a. $030^{\circ} - 13.2^{\circ}$
 - b. $040^{\circ} - 20^{\circ}$
 - c. $050^{\circ} - 26.5^{\circ}$
 - d. $200^{\circ} - 27^{\circ}$
 - e. $230^{\circ} - 40^{\circ}$

3. The sandstone in Figure 1a is a
 - a. Tabular body 100m thick
 - b. Tabular body 50m thick
 - c. Wedge shaped body which gets thicker towards the SE
 - d. Wedge shaped body which gets thicker towards the NW
 - e. Dome shaped body of variable thickness.

4. The base of a Jurassic conglomerate horizon has a strike of 080° and a dip of 20° the outcrop pattern on Figure 1a would:

- Cover the entire map
- Cover the northern part of the map
- Cover the southern part of the map
- Be restricted to two strips coinciding with the two ridges.
- Be restricted to one strip along the ENE edge of the map.

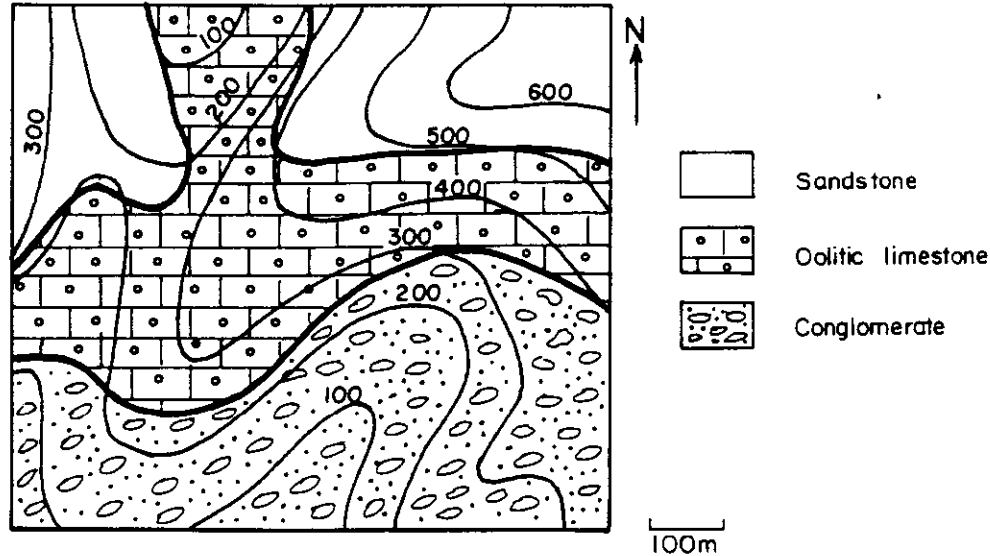
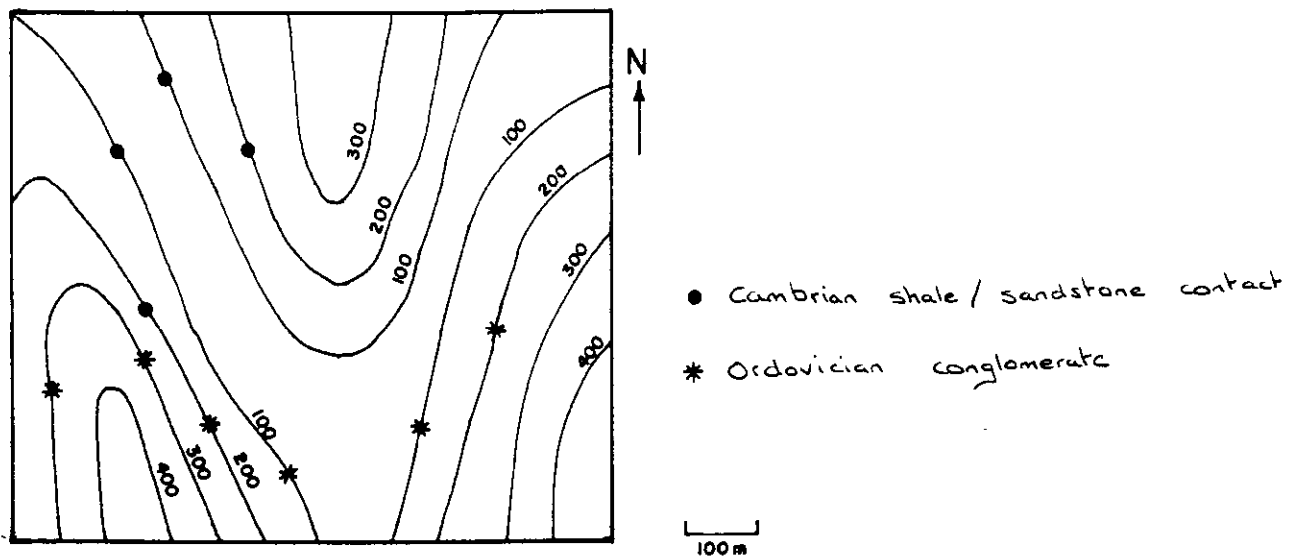


Figure 2 shows an area of Palaeozoic Strata. The beds are all of constant thickness. The conglomerate is 500m thick, the oolitic limestone is 300 m thick and the sandstone is 700m thick.

- The surface of the oolitic limestone is best described as:
 - planar inclined
 - planar horizontal
 - curviplanar - structural contours are straight but the amount of dip varies
 - curviplanar - structural contours are curved.
 - curviplanar structure contours are curved and the amount of dip varies.
- The conglomerate horizon is:
 - planar horizontal
 - ~~curviplanar~~ planar steeply inclined to the SSE
 - Dipping at a low angle to the NW
 - Curviplanar dipping at a low angle to the SE
 - Curviplanar vertical.



A sandstone/shale contact is exposed at the points shown on the map (Figure 3) by black circles. The lower boundary of a conglomerate horizon is exposed at points shown on the map by stars.

7. The apparent dip of the sandstone/shale contact in an N-S direction is:
 - a. 30° S
 - b. 18° N
 - c. 10° S
 - d. 11° N
 - e. 24° S
8. What is the plunge of the intersection of the two beds?
 - a. $30^\circ - 220^\circ$
 - b. $25^\circ - 230^\circ$
 - c. $15^\circ - 235^\circ$
 - d. $30^\circ - 055^\circ$
 - e. $18^\circ - 050^\circ$
9. What is the pitch of the intersection of the two beds on the conglomerate horizon?
 - a. 48° NW
 - b. 15° SW
 - c. 60° E
 - d. 22° SW
 - e. 30° N

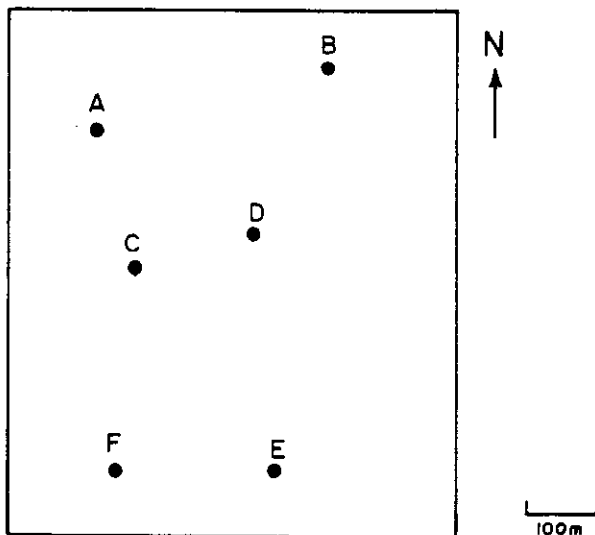


Figure 4 is a map of a coal mining area. The top of a coal horizon has been found at a depth (relative to sea level) of -300m in Borehole A, 100m in Borehole B, -300m in Borehole C, -300m in Borehole D, -200m in Borehole E and -100m in Borehole F. Use this data to answer questions 10-11.

10. If the topography of the area was flat lying and at an elevation of 300m then you would expect to see the coal outcrop.
 - a. 120m from Borehole B in the direction 031°
 - b. 700 m from Borehole D in the direction 090°
 - c. 480 m from Borehole F in the direction 211°
 - d. All of the above
 - e. None of the above.

11. Assuming that the beds have not been inverted the structure of the area is:
- A cylindrical symmetrical synformal syncline trending 121° - 301° with a horizontal axis.
 - A cylindrical symmetrical antiformal anticline trending 150° - 330° with a horizontal axes.
 - A cylindrical asymmetrical synformal syncline trending 301° - 121° with a horizontal axis.
 - A non-cylindrical asymmetrical antiformal anticline trending 330° - 150° with a horizontal axis
 - A non-cylindrical asymmetrical synformal syncline trending 121° - 301° with a horizontal axis.

12. A bed outcropping at the surface is 200 m wide. The upper boundary lies at 400m above sea level and the lower boundary at 350 m above sea level. The bed dips at 30° in the same direction as the topographic slope. What is the true thickness of the bed?
- 69.2m
 - 53.5m
 - 48.3m
 - 35.4m
 - 29.7m

Use the data from Figure 5 and Table 1 to answer questions 13-20.

13. What is the plunge of the beds.
- All of the beds plunge by the same amount in the same direction
 - The conglomerate plunges 20° \rightarrow 280° , the sandstone plunges 30° \rightarrow 270° , the limestone plunges 50° \rightarrow 270° and the volcanics plunge 40° \rightarrow 270° .
 - The conglomerate is planar and unfolded, the sandstone plunges 36° \rightarrow 266° , the limestone plunges 56° \rightarrow 270° and the volcanics plunge 47° \rightarrow 270°
 - The conglomerate is planar and unfolded, the sandstone plunges 38° \rightarrow 100° , the limestone plunges 59° \rightarrow 090° , and the volcanics plunge 47° \rightarrow 081° .
 - The conglomerate is planar and unfolded, all the other beds plunge 36° \rightarrow 271° .
14. The interlimb angles between bed A and bed D are:
- 49° and 131°
 - 78° and 102°
 - 24° and 156°
 - 52° and 128°
 - 69° and 111°
15. The apparent dip of bed I towards 180° is
- 24°
 - 32°
 - 48°
 - 56°
 - 68°
16. The pitch of the cleavage in bed C is
- 69° NE
 - 48° E
 - 57° NE
 - 74° SW
 - 62° SW

17. What was the plunge of the fold in the limestone when the conglomerate was first deposited

- a. $20^\circ - 209^\circ$
- b. $40^\circ - 260^\circ$
- c. $36^\circ - 273^\circ$
- d. $34^\circ - 190^\circ$
- e. $12^\circ - 270^\circ$

18. A groove cast on the base of the conglomerate horizon pitches 40° S. What was its original orientation?

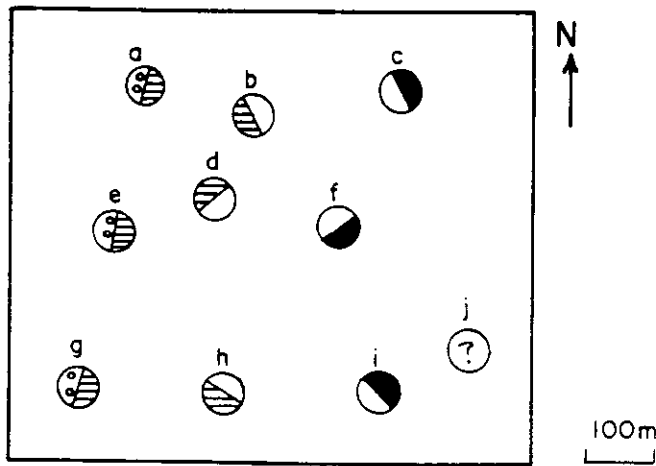
- a. 230°
- b. 220°
- c. 210°
- d. 200°
- e. 190°


19. If the conglomerate horizon was inverted what would the orientation of the lineation have been:


- a. 320°
- b. 330°
- c. 310°
- d. 040°
- e. 050°

20. Two apparent dips were measured at locality J these were: $30^\circ \rightarrow 135^\circ$ and $60^\circ - 174^\circ$. They represent a bed with which of the following orientations.

- a. $160^\circ/24^\circ$
- b. $140^\circ/50^\circ$
- c. $120^\circ/65^\circ$
- d. $080^\circ/20^\circ$
- e. $090^\circ/75^\circ$



 contact between Quaternary conglomerate and Permian sandstone.

 contact between Permian sandstone and Triassic limestone.


 contact between Triassic limestone and Jurassic volcanics.

Figure 5 is a map showing the locations at which a series of structural data were collected. This data is shown below:

Locality	Rock Type	Bedding	Cleavage
A	Conglomerate Sandstone	190/20 150/40	
B	Sandstone Limestone	150/40 150/59	
C	Limestone Volcanics	150/59 150/51	247° 70°
D	Conglomerate Sandstone	190/20 230/52	
E	Sandstone Limestone	230/52 230/62	
F	Limestone Volcanics	230/62 230/59	
G	Conglomerate Sandstone	190/20 120/53	
H	Sandstone Limestone	120/53 120/73	
I	Limestone Volcanics	120/73 120/66	

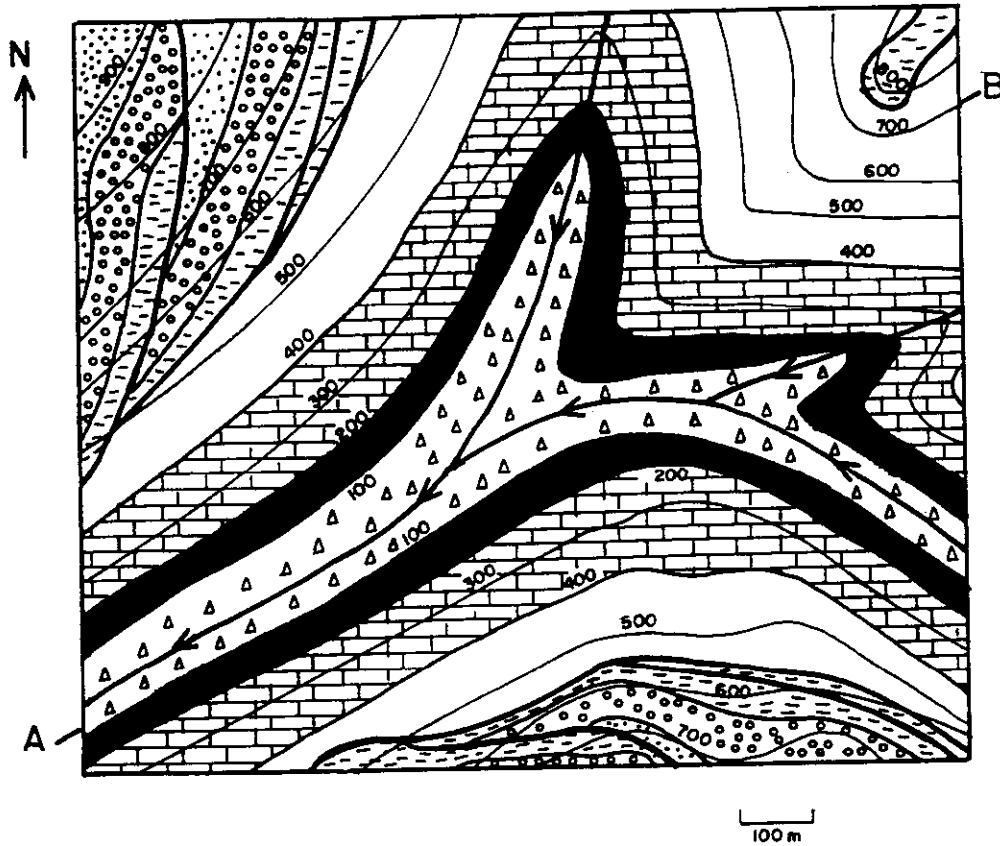
Use this data to answer questions 13-20.










Name.....

Q. No.					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E

Section C (20 marks)

Examine the map below and use it to answer all of the questions in this section.



- | | | | |
|---|--------------|---|----------------------------|
|  | Sandstone |  | Stream + direction of flow |
|  | Conglomerate |  | Faults |
|  | Mudstone | | |
|  | Gypsum | | |
|  | Limestone | | |
|  | Shale | | |
|  | Volcanics | | |

