General Certificate of Education
January 2008
Advanced Level Examination

GEOGRAPHY (SPECIFICATION A) **GGA7/PM**
Unit 7 Fieldwork Investigation

You will need no other materials.

To be issued to candidates on 1 December prior to the examination

Pre-release material

Instructions

- This material must be kept **unmarked** for use in the forthcoming examination.
- The centre two-page section of this booklet contains coloured photographs, which can be detached.

Advice

- You should use the information contained in this booklet to become familiar with the aims, methods and data provided. Methods of data presentation should be considered and subsequent analysis and conclusions drawn. Enquiry related issues should be explored. You should use your own experience of fieldwork.

TITLE OF ENQUIRY

How does the sand spit at Ynyslas change as the distal end is approached?

AIM

The aim of this enquiry is to determine if and how selected features of the spit change in long and cross profile as its northern distal end is approached.

In order to complete this enquiry, a number of objectives can be identified.

Objective 1. To determine whether the size of material changes along and across the spit.

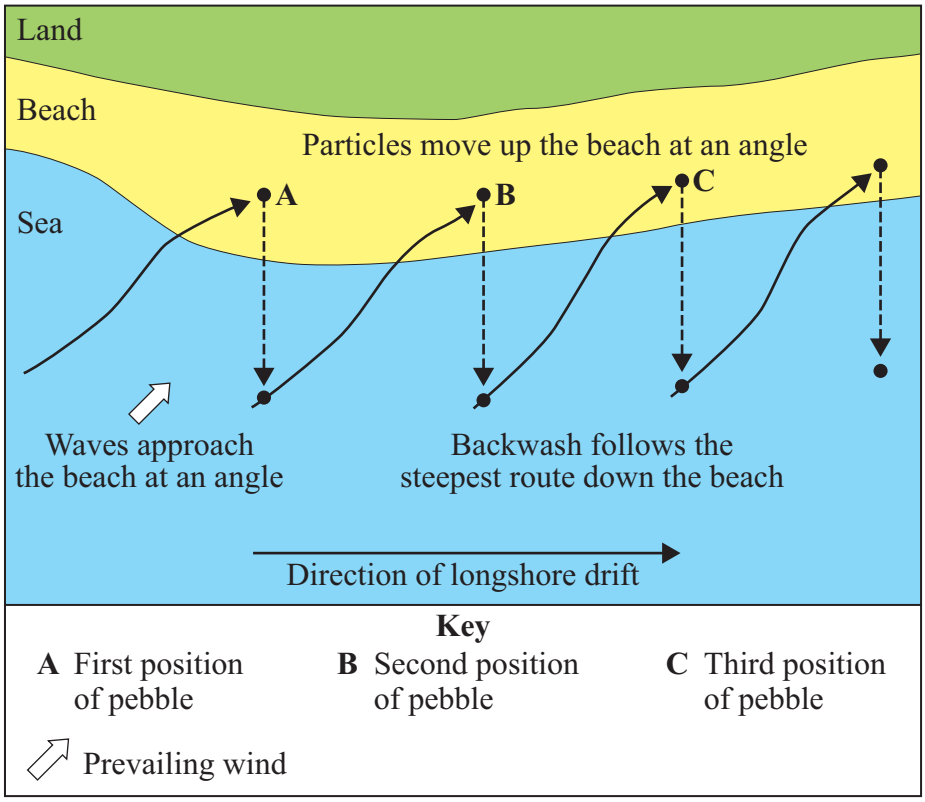
Objective 2. To determine whether the roundness of material changes along and across the spit.

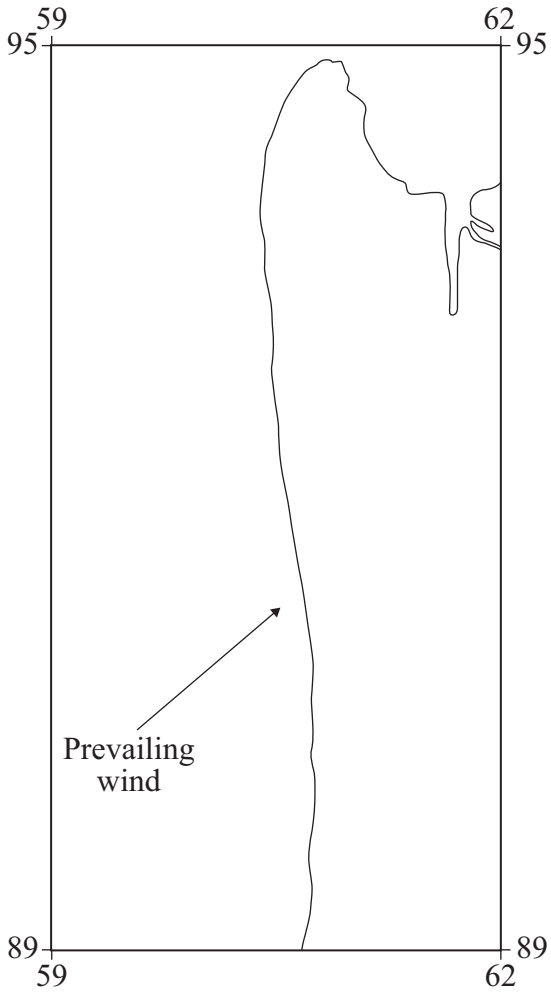
Objective 3. To determine whether the profile changes along the spit.

BACKGROUND INFORMATION

Certain conditions are required for the formation of the coastal landform of a spit. These include the presence of the process of longshore drift, an abundant supply of material, a dominance of constructive waves and a change in direction of the coastline. The spit at Ynyslas is found within the Cardigan Bay sediment cell and is formed across the estuary of the River Dyfi. **Figure P1** suggests the expected outcomes regarding the objectives related to the underlying theory. **Figure P2** is a 1:25 000 OS map extract of part of the spit. The study focused on the shingle ridge which extends the length of the spit from Borth in the south to its distal end at OS 608949.

Figure P1





'As the spit continued to grow, storm waves threw some larger material above the high water mark making the feature more permanent; while, under normal conditions, the finer sand was carried towards the end of the spit.'

(Waugh Geography: An Integrated Approach)

'Sand produces shelving beaches, whereas shingle beaches may approach angles of 30°. Larger material collects in the upper part of the beach because returning backwash deposits heavier particles first, whilst finer material is carried seawards.'

(Hordern: Rivers and Coasts)

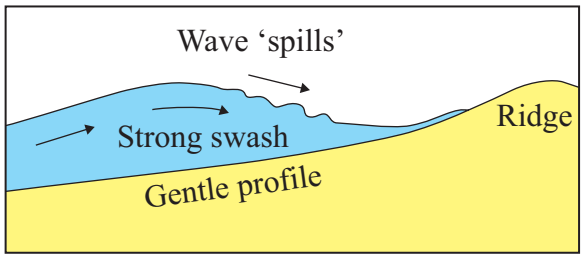


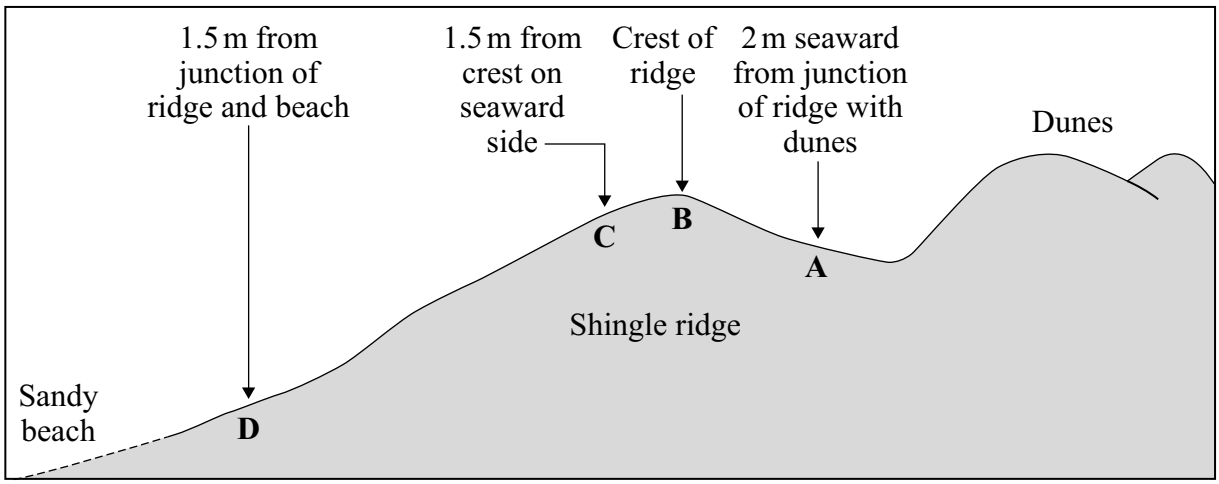
Figure P2

Ordnance Survey Map extract of part of the spit at Borth
not reproduced here due to third-party copyright constraints.

Explorer Outdoor Leisure 213 1:25000.
Eastings : 59 to 62
Northings : 89 to 95

Figure P3 (in the centre of this booklet) shows the main study area, with photographs of different parts of the spit. An approximate 200 metre section of the spit was studied in grid square 6093. Ten transects were identified at least 10 metres apart from each other. Transect 1 was the most southerly. Along each of these transects, the size of beach material was measured at four sample sites, **A**, **B**, **C** and **D**. The location of these sample sites is shown in **Figure P4**.

Figure P4



At each of the four sample sites along the transect, 50 pieces of beach material were selected by following the steps below.

1. Sit down at sample site.
2. Close eyes and extend right arm forwards to full stretch.
3. Pick up first piece of material with which forefinger comes into contact and place in container.
4. Repeat steps 2 and 3, ensuring pebbles are selected in an arc made with right arm at full stretch.
5. When 25 pieces of material have been selected, repeat to the left-hand side.

The material was then measured and the radius of curvature identified.
The raw data for transect 1 are given in **Figure P5**, whilst the mean long axis of beach material for all transects is given in **Figure P6a** and the standard deviation for the long axis of beach material is given in **Figure P6b**.

Figure P5

Sample Site A

Item number	Long axis (cm)	Radius* (cm)
1	21	4
2	15	2
3	18	3
4	18	3
5	13.5	3
6	14	3
7	14	6
8	13	3
9	14	4
10	12	4
11	8	3
12	13.5	2
13	11	2
14	9	1
15	16	4
16	12	3
17	16	3
18	10	1
19	12	3
20	10	3
21	12	3
22	10	2
23	7	2
24	7.5	2
25	7	3
26	11	1
27	7	2
28	8	3
29	7	3
30	6	1
31	10	2
32	8.5	1
33	9	3
34	7	2
35	9	3
36	9	2
37	8	1
38	9	2
39	9	3
40	10	3
41	6	2
42	11	2
43	8	2
44	7	3
45	12	3
46	7	2
47	14	2
48	8	2
49	8	3
50	9	2

Sample Site B

Item number	Long axis (cm)	Radius* (cm)
1	6	2
2	7	2
3	12	5
4	9	2
5	9.5	1
6	9	2
7	10.5	2
8	10	1
9	7	2
10	10	2
11	6	2
12	7.5	2
13	6	1
14	9	2
15	7.5	2
16	11	2
17	10.5	3
18	6.5	2
19	9.5	3
20	8	3
21	10	3
22	14	4
23	12	3
24	10	2
25	9	3
26	23	6
27	11	3
28	6	2
29	12	7
30	8.5	1
31	7	3
32	5	2
33	6.5	2
34	8	1
35	6.5	2
36	6.5	1
37	7	2
38	5	2
39	4	2
40	12	1
41	9	1
42	9	3
43	10	2
44	7	3
45	17	4
46	9	4
47	9	3
48	6	2
49	9	4
50	10	2

Sample Site C

Item number	Long axis (cm)	Radius* (cm)
1	6.9	2
2	5.4	2
3	6.6	2
4	4.2	2
5	5.6	2
6	5.5	1
7	4.9	2
8	10.2	4
9	5.7	3
10	5.2	3
11	5	2
12	5.5	3
13	5.9	3
14	9.3	4
15	10.5	5
16	7.8	3
17	7	3
18	4	2
19	5.2	2
20	5.2	3
21	6.6	4
22	7.2	4
23	5	2
24	5	2
25	4.1	2
26	4.1	2
27	7.2	3
28	7.2	3
29	6	3
30	13.6	6
31	8.1	4
32	3.6	2
33	3.8	2
34	8	4
35	4	2
36	6.2	3
37	3.5	2
38	3.3	2
39	5.5	3
40	5.3	3
41	6.3	3
42	5.6	3
43	5.7	3
44	8.2	4
45	8.2	4
46	8.1	4
47	3.1	2
48	9.8	5
49	6	3
50	10	5

Sample Site D

Item number	Long axis (cm)	Radius* (cm)
1	4.6	1
2	3.2	0.8
3	4	1
4	5.4	2
5	7	1
6	4.1	1
7	5.1	1
8	10	2
9	9.5	2
10	4.9	1
11	5.1	1
12	4.6	1
13	4.5	1
14	2.5	0.6
15	3.4	0.8
16	3.2	0.4
17	3	0.6
18	6	2
19	18	7
20	8	2
21	3.6	1
22	7.8	2
23	3.3	4
24	2.8	1
25	5	1
26	5.5	1
27	4	3
28	8.3	4
29	10.9	3
30	9.5	3
31	17	3
32	12.5	2
33	6	2
34	7	1
35	6.8	1
36	3.2	3
37	9.4	1
38	6	1
39	3.1	1
40	7.5	1
41	8	3
42	5.5	0.8
43	4.1	1
44	3.2	0.8
45	5.5	2
46	6.7	1
47	4.9	1
48	2.9	1
49	4	1
50	4.2	0.6

*Radius is radius of curvature.

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Figure P6a

	Mean long axis of beach material (cm)				
Transect Number	**Sample Site A**	**Sample Site B**	**Sample Site C**	**Sample Site D**	**Overall Mean**
1	10.62	8.99	6.28	6.09	**8.00**
2	8.49	10.10	10.30	6.70	**8.90**
3	11.20	8.99	8.66	8.95	**9.45**
4	16.70	no data	9.52	8.47	**11.56**
5	7.32	7.52	10.40	6.38	**7.91**
6	11.70	9.84	8.08	7.20	**9.21**
7	12.20	no data	8.77	9.17	**10.05**
8	9.48	8.49	9.12	7.13	**8.56**
9	12.40	10.80	7.38	7.82	**9.60**
10	10.40	7.19	7.68	6.15	**7.86**
Overall Mean	**11.05**	**8.99**	**8.62**	**7.41**	**9.02**

Figure P6b

	Standard deviation (cm)			
Transect Number	**Sample Site A**	**Sample Site B**	**Sample Site C**	**Sample Site D**
1	3.41	3.14	2.12	3.29
2	3.38	3.94	4.33	4.00
3	3.41	3.04	3.81	3.56
4	4.37	no data	2.93	4.91
5	3.52	3.17	3.12	2.30
6	3.29	3.17	2.51	2.23
7	3.14	no data	2.74	3.01
8	2.47	2.19	2.93	2.32
9	3.48	3.14	2.20	2.29
10	3.01	1.92	2.06	1.20

The long axis and radius of curvature data were then used to derive the Cailleux roundness index. The mean Cailleux roundness index for all transects is shown in **Figure P7**.

Figure P7

	Mean Cailleux roundness index			
Transect Number	**Sample Site A**	**Sample Site B**	**Sample Site C**	**Sample Site D**
1	499.83	563.03	949.61	563.87
2	492.84	550.51	415.73	549.77
3	476.10	462.62	524.50	635.56
4	342.94	no data	278.48	565.86
5	489.85	533.11	486.92	595.41
6	408.19	491.02	490.93	551.73
7	387.98	no data	272.84	509.21
8	374.64	421.42	511.54	567.50
9	420.12	458.52	527.58	426.90
10	496.96	505.01	849.80	469.66

The profile of the shingle ridge was measured at four of the transects – 1, 4, 7 and 10. Two ranging poles and a spirit level were used to carry out the profiling task. Where the ridge did not appear to show very small changes, measurements were carried out at intervals of between 50 and 100 cm. On other occasions, where there appeared to be greater small-scale variation, measurements were done every 10–50 cm.

To begin the profile, a ranging pole was placed at the end of the shingle ridge at the duneward side. A second ranging pole was placed at the required interval (determined by previous observation of the slope). The ranging poles were inserted into the ridge to the same depth. A spirit level was placed at the one metre marker on the first pole and the bubble checked to ensure accuracy. The height of the spirit level on the second pole was noted and one metre was subtracted from the observed value of the second pole. If the resulting figure was positive there was an increase in height of the ridge, whilst a negative indicated a decrease. Measurements continued until the end of the shingle ridge was reached at the sandy beach. The data collected are shown in **Figure P8**.

Figure P8

Transect 1

Distance Section	Distance from 0 cm mark	Height Difference
(cm)	(cm)	(cm)
100	100	–20.5
50	150	–4.5
20	170	3
20	190	–8
20	210	–14
20	230	–3
20	250	–12
20	270	–13.5
20	290	–11
50	340	–11
50	390	–13.5
50	440	–7.5
20	460	–3
20	480	–5
20	500	–12.5
20	520	–10
20	540	–3.4
20	560	–1
50	610	–13
50	660	–8.4
50	710	–12
50	760	–16
50	810	–5
50	860	–16.5
100	960	–3
50	1010	–19
50	1060	–9
50	1110	–9

Transect 4

Distance Section	Distance from 0 cm mark	Height Difference
(cm)	(cm)	(cm)
100	100	4
100	200	6
40	240	5
60	300	6
100	400	5
100	500	12
50	550	4
50	600	7
100	700	3
100	800	–5
75	875	–11
25	900	–27
100	1000	–4
100	1100	–2
100	1200	–1
100	1300	–1
30	1330	–16
70	1400	–10

Transect 7

Distance Section	Distance from 0 cm mark	Height Difference
(cm)	(cm)	(cm)
100	100	8
100	200	8
100	300	7
100	400	11
100	500	–9
100	600	–52
100	700	–28
100	800	–37
100	900	–29
100	1000	–34
100	1100	–27
100	1200	–8

Transect 10

Distance Section	Distance from 0 cm mark	Height Difference
(cm)	(cm)	(cm)
100	100	–4.5
100	200	–2.5
100	300	0
100	400	–0.5
50	450	2
50	500	2
20	520	–2
20	540	–2
20	560	–4
10	570	–2.4
10	580	–6.5
10	590	–3.5
10	600	–2.5
10	610	–6
10	620	–5.4
10	630	–3
10	640	–2.7
20	660	–3.4
20	680	–11
20	700	–7
20	720	–1
20	740	–17
30	770	–8
50	820	–12
50	870	–16.5
50	920	–14.5
50	970	–12
20	990	–5
20	1010	–8
20	1030	–12
20	1050	–7.5
20	1070	–12
20	1090	–1
50	1140	–8
50	1190	–11.5
50	1240	–11.5

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Photographs of the dunes in the vicinity of the Visitor Centre can be seen in **Figures P9a** and **P9b**. These indicate the recreational use of dunes and their management.

Figure P9a

Figure P9b

Figures P10a and **P10b** show the groynes at Ynyslas, a local coastal management strategy. **Figure P10b** shows the most northerly groyne on the spit.

Figure P10a

Figure P10b

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Geography: An Integrated Approach, Waugh, D. Nelson Thornes Publishers.

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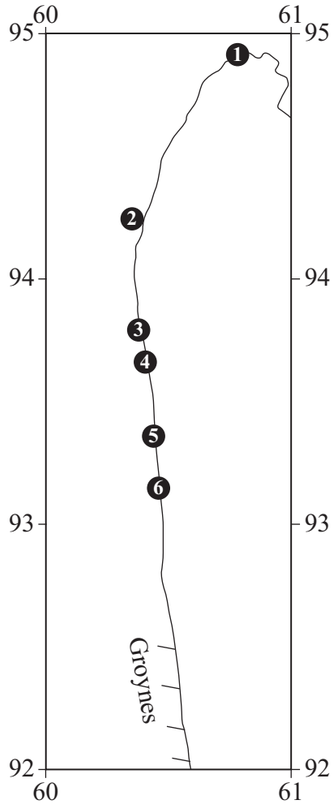
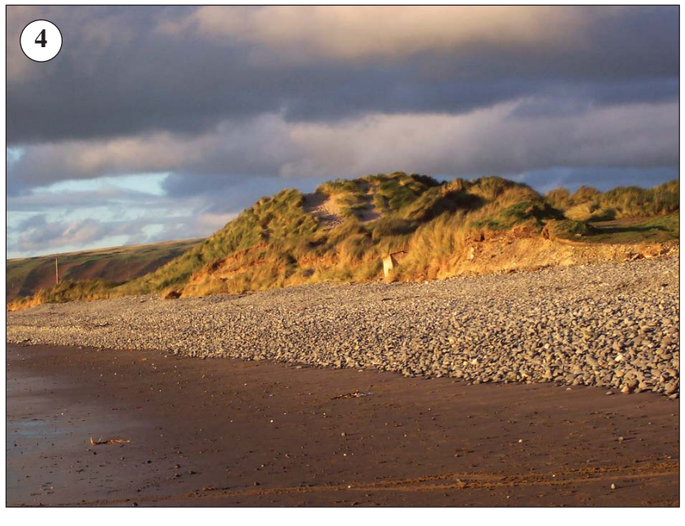
Figure P3

Key

❶ Approximate location of photograph





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