X208/701

GEOGRAPHY
ADVANCED HIGHER

1. Candidates are expected to attempt **two** questions, **one** from Section A and **one** from Section B.

2. Both questions in Section A are worth 30 marks each and both questions in Section B 20 marks each.

3. In all questions, marks will be given for sketch-maps and diagrams which are integral parts of an answer.

4. Candidates are encouraged to use the Supplementary Items and tracing paper provided for annotation or as bases for diagrams. If used, the resources should be placed inside the front cover of the candidate's answer book and thus sent to the Scottish Qualifications Authority.

5. Candidates are reminded that they have an atlas which can be a valuable resource in answering questions in both parts of the paper.

SECTION A

Answer ONE question ONLY from this Section

Map Interpretation

Supplementary Item A, Ordnance Survey Map, Extract No 1561/EXP180 1:25 000 (Explorer Series) Witney, Oxfordshire, is the basis for answers to questions in this Section.

For whichever question you choose in this Section (ie 1. or 2.) you are expected to make <u>extensive and detailed use</u> of your atlas and the map extract.

Marks

1. Many commercial and industrial companies, especially in the Midlands and South East England, encourage initiative and teamwork in their managers or in their working teams by sending them on "team building events". Some of the most popular activities include paint ball games and assault courses where stamina, tolerance and working together can be developed.

   Most of these events will last for a long weekend or be a substitute for a five day working week. The social side and evening entertainment are important aspects of the whole experience.

   A site of **1 km × 1·5 km** is being sought for the first stage of a development which will consist of areas for:
   - paint ball games
   - assault course
   - quad bikes.

   (*a*) Identify **one** suitable location for the development and draw it **to scale** on the tracing overlay, *Supplementary Item B*. **4**

   (*b*) Discuss **in depth** and with **detailed evidence from the OS map extract** the reasons for your choice of location. Your answer should also include likely effects on the local population and environment. **14**

   (*c*) With the help of your **atlas**, discuss the suitability of this part of England for the location of such a development. **6**

   (*d*) Using the map extract and atlas, **explain** how your chosen site may be developed further in future. **6**

   (30)

2. (*a*) Describe **and** account for the distribution of the full range of types of **settlement** in the whole area of the map extract.

   You should make direct and detailed reference to a range of factors, including relief and drainage. Give detailed map evidence to support all parts of your answer. **18**

   (*b*) The government has identified a need in this part of England for a very large number of new houses in the next twenty years. Assess the impact further development of settlement in this area may have on both the settlements you have described in part (*a*) and on the rural environment in the whole area of the map extract. **12**

   (30)

[Turn over for Question 3 on *Page four*

Answer ONE question ONLY from this Section

For whichever question you choose in this Section (ie 3. or 4.) you are encouraged to make use of your atlas.

3.   **Table Q3: Discharge rates and sediment transport rates at the gauging station on a stream called Allt Dubhaig**

Sample time	Discharge (m³/s) *1	Sediment transport rate (g/s) **2
1	7·07	4·13
2	3·43	0·47
3	4·77	0·26
4	6·57	1·26
5	5·12	0·66
6	6·18	1·06
7	3·27	0·04
8	5·79	4·7
9	4·25	1·89
10	3·51	0·16
11	4·96	1·5
12	7·61	3·14
13	3·92	0·03
14	5·79	1·03
15	6·81	1·33

Key
 *1: m³/s = cubic metres per second
**2: g/s   = grams per second

The data in Table Q3 show a series of measurements for Allt Dubhaig, a small stream in the headwaters of the River Tay, located in the Pass of Drumochter in the Scottish Highlands.

The **discharge rate** was calculated by measuring water level continuously. The observed flow level values were converted to discharge values by using a calibration curve. A calibration curve is a graph which shows the relationship between flow level and flow rate. It was based on accurately measured discharge values from 15 different flow level samples in the stream.

The **rate of movement of sediment** was calculated from measurement of the amount of sediment that was collected in sediment traps located across the full width of the stream channel. These traps collect the entire bed load and some of the suspended load. (The proportion of total sediment in suspension for this stream is small, so that the traps give a value that is close to the total stream load.)

The data set was obtained over a two-year period. Each of the measurements followed a flood event. Flood events lasted between 1–6 hours, and the traps were emptied immediately after the flood. The flow level was recorded continuously throughout the period by the use of an automatic data logger.

3. (continued)

(*a*) Complete the calculation of the Pearson Product Moment correlation coefficient using the formula given below.

You should show most of your working on *Supplementary Item C*.

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

where x = discharge
and y = sediment transport rate

r = Pearson Product Moment correlation coefficient
(where r will be in the range -1 to $+1$)
The value of r should be calculated to two decimal places.   **4**

(*b*) Explain briefly the meaning of the statistical value obtained.   **3**

(*c*) Explain why the Pearson Product Moment correlation coefficient is suitable for measuring the correlation between the two elements in this data set.   **3**

(*d*) Considering the result of this test (as stated in your answers to parts (*a*) and (*b*)), what reasons may there be for the deviation from a perfect correlation in a stream like the Allt Dubhaig?   **6**

(*e*) Name **one** other statistical method which could be used to investigate the relationship between the two sets of data for the Allt Dubhaig, and explain briefly what this test may reveal about the data.   **4**

(20)

[Turn over for Question 4 on *Page six*

4. (*a*) There are **three** main categories used for the sampling of data:

Random   **Systematic**   **Stratified**.

For **each** type of sampling method, describe fully how this method is used, and discuss its advantages and disadvantages.   **9**

(*b*) A student is conducting a soil investigation where a number of different sampling techniques could be used.

The sample area is 1 km by 2 km. The underlying geology shows 40% of the land is limestone, 20% clay and 40% sandstone. In all, 50 soil samples will be required.

The student needs to:

• ensure that all samples taken are representative of the whole sample area

• gather pH and soil moisture data

• measure air temperature at 8 sites within the sample area.

Which **sampling methods** would be best suited to gather the data as described above? Give reasons for your choices.   **11**
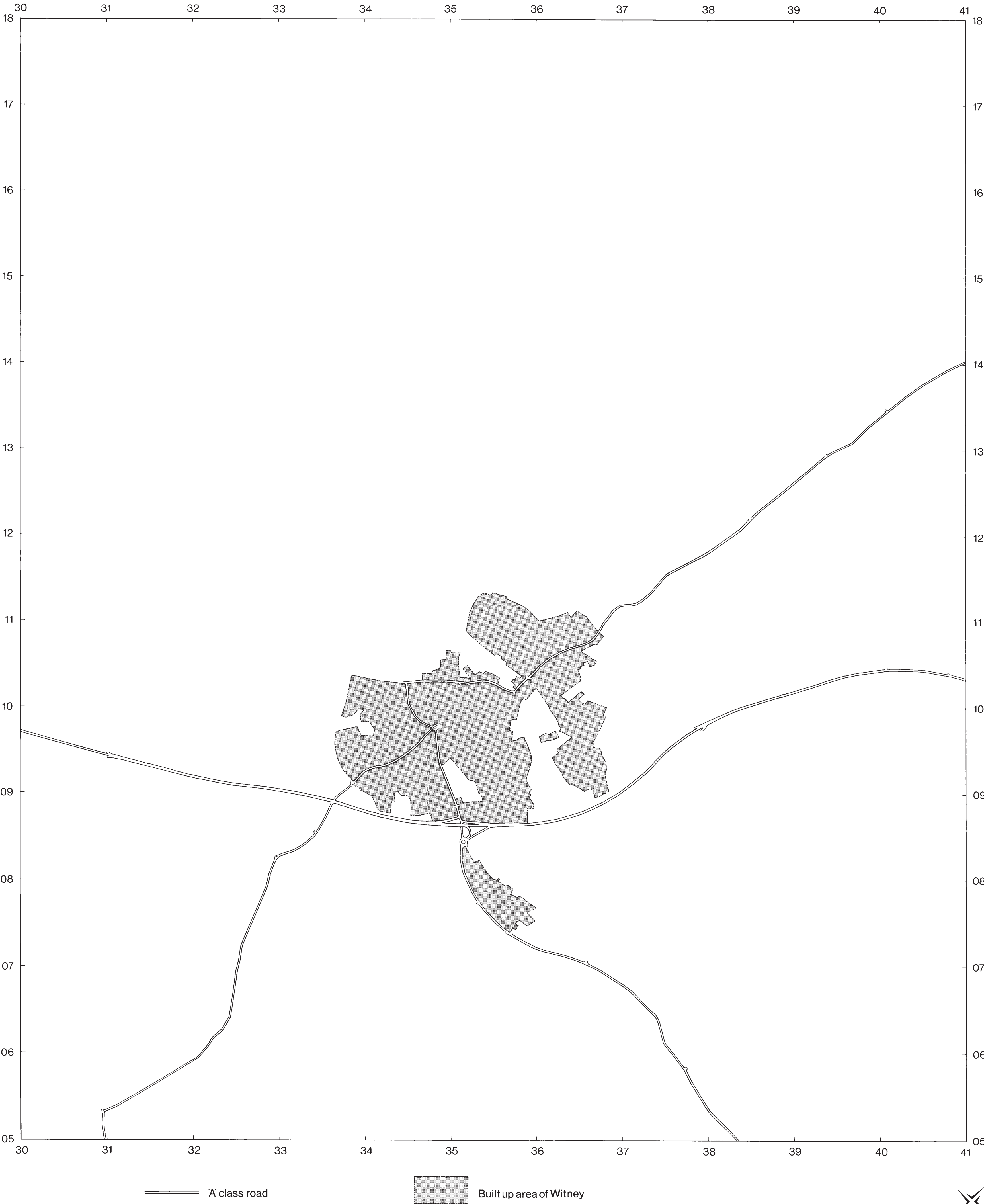
(20)

[END OF QUESTION PAPER]

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X208/703

Full name of centre ....

Name of candidate .... Date of birth ....

———— 'A' class road

Built up area of Witney

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NATIONAL
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2007

MONDAY, 28 MAY
9.00 AM – 11.00 AM

GEOGRAPHY
ADVANCED HIGHER
SECTION B
Supplementary Item C
for Q3

Fill in these boxes

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

If annotated by the candidate to be placed inside
the front cover of the candidate's book and
thus sent to the Scottish Qualifications Authority.

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SUPPLEMENTARY ITEM C

	Discharge	Sediment transport rate					
	x	y	$(x - \overline{x})$	$(y - \overline{y})$	$(x - \overline{x})^2$	$(y - \overline{y})^2$	$(x - \overline{x})(y - \overline{y})$
1	7·07	4·13	1·80	2·69	3·24	7·24	4·84
2	3·43	0·47	−1·84	−0·97	3·39	0·94	1·78
3	4.77	0·26	−0·50	−1·18	0·25	1·39	0·59
4	6·57	1·26	1·30	−0·18	1·69	0·03	−0·23
5	5·12	0·66	−0·15	−0·78	0·023	0·61	0·12
6	6·18	1·06	0·91	−0·38	0·83	0·14	−0·35
7	3·27	0·04	−2·00	−1·40	4·00	1·96	2·80
8	5·79	4·70	0·52	3·26	0·27	10·63	1·70
9	4·25	1·89	−1·02	0·45	1·04	0·20	−0·46
10	3·51	0·16	−1·76	−1·28	3·10	1·64	2·25
11	4·96	1·50					
12	7·61	3·14					
13	3·92	0·03					
14	5·79	1·03					
15	6·81	1·33					