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<p><b>Group III</b> <b>Sciences</b></p>
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# NATURAL ECONOMY

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Paper 0670/01

Paper 1

## General comments

In general, the Paper addressed areas of the syllabus with which the majority of candidates were familiar, and most had been well prepared for the Paper. **Question 3** proved difficult for many candidates and, as a result, there were fewer very high marks than in some previous years. However, it was again encouraging to note that the number of candidates failing to get to grips with the Paper at all appears to have declined.

## Comments on specific questions

### Question 1

This question addressed various aspects of energy production, and was generally well answered.

- (a) (i) and (ii) were generally answered correctly, though (iii) proved rather more demanding; candidates having to recognise the three fossil fuels used and correctly add them together. A surprising number seemed unable to correctly identify the three fossil fuels. In (iv), most were able to state two disadvantages of a heavy reliance on fossil fuels.
- (b) In part (i), most candidates were able to explain why fuelwood might be regarded as a renewable form of energy, though they seemed less secure when trying to explain possible non-renewable aspects in (ii). Many seemed unaware that the unsustainable gathering of fuelwood might lead to the exhaustion of supplies. Part (iii) seemed to puzzle the majority of candidates, most seeming very unsure as to what a biological source of energy might be.
- (c) This was generally correctly answered.
- (d) This part required candidates to suggest strategies to reduce the pollution caused by fossil fuels. Most were able to do so, though many answers were rather vague and lacked clarity.

### Question 2

This question was largely concerned with water-related diseases, and the areas addressed were generally well known.

- (a)(i) This required candidates to identify areas at risk from malaria from a world map. Most were able to do so. The map also showed areas of the world where summer temperatures exceeded 21 degrees centigrade and in (ii), candidates were asked to suggest why this information had been included. Though many candidates did notice that areas at risk from malaria were generally those areas with summer temperatures exceeding 21 degrees centigrade, many did not.
- (b)(i) This required candidates to explain the term 'water-related disease'. Most displayed an understanding of the term, though few were able to go into sufficient detail to gain the two marks available.
- (ii) This asked candidates to choose a water related disease and explain how it is transmitted. Malaria was the most popular choice, and some candidates produced excellent answers, showing a good level of detailed knowledge and understanding.
- (iii) This was generally well known, with most candidates gaining at least two marks.
- (c) This proved rather more testing. Candidates were asked to suggest the most effective of the ways suggested in (b)(iii), and give reasons. Few were able to state in detail the reasons for their preferred method.

### Question 3

This proved to be the most demanding of the questions, and a significant number of candidates failed to score at all. Many more scored only two or three marks, with many seeming unfamiliar with the areas addressed in the question, despite the fact that questions of this nature have appeared before, and section 13.6. of the syllabus requires a knowledge of 'major climatic types through interpretation of climate graphs and maps'.

- (a)(i) This required candidates to calculate the range of temperature at a place. The majority were unable to do so.
  - (ii) Candidates normally scored all three marks here, or none at all. Those familiar with climatic data found this fairly straightforward. Regrettably, those were in the minority.
  - (iii) Candidates who responded correctly to (ii) generally were able to identify A as an equatorial climate and D as a desert. Many, however, were unable to do so.
- (b) In this part, candidates were asked to suggest which of four climates was likely to be the most difficult for farming. Most chose D, but relatively few related their answers specifically to farming, thus failing to pick up the two marks available.
- (c) This part of the question required candidates to explain the effects of large scale deforestation on the atmosphere. Most candidates were able to obtain some credit here, though answers were often vague and lacking in substance. Part (ii) asked candidates to identify an effect on world climates. Many were able to recognise the possibility of global warming.
- (d) This part asked candidates to explain the need for international action to reduce atmospheric pollution. The majority of candidates failed to address the international aspect, and merely wrote about why atmospheric pollution was a bad thing. The best answers recognised that atmospheric pollution can be carried from one country to another.

### Question 4

This question concerned the 'North-South divide' and issues surrounding population growth and, for many, this question proved to be the most productive of marks.

- (a) (i) and (ii) were generally answered correctly, though in part (iii), the command 'describe the distribution' seemed to puzzle many candidates, and few managed to gain both marks available.
- (b)(i) This required candidates to define the terms life expectancy and infant mortality. Most were able to do so.
- (ii) This required candidates to explain the rapid population growth that is taking place in many developing countries. Most were able to make valid points here, though very few suggested that falling death rates contributed to population growth. The majority confined themselves to give reasons why the birth rate remained high.
- (iii) This was generally well known.
- (c) This part required candidates to suggest ways in which governments might influence population growth. Most had some suggestions to make here, though many did not make it clear whether the suggested methods were intended to reduce or increase population growth.

### General comments

Among candidates achieving half marks or more, there was usually little variation in overall quality of answers between the two questions; for lower achieving candidates the disparity was sometimes more noticeable, with **Question 2** likely to have yielded the higher of the two marks. **Question 2** contained the majority of the questions that examined practical skills and this was a contributory factor to the better performance from less able candidates whose supporting knowledge was weaker. As usual, few of the questions were left unattempted and the lines left for the answers were filled up by the majority of candidates. Despite the breadth of syllabus content examined, most candidates demonstrated more than an outline familiarity with the content, notably for the water cycle, soil erosion and conservation, irrigation and energy sources. Least well known of the major topics examined in this session were methods of mining, although a general comment like this masks the existence of wide variations from candidate to candidate and between Centres. Those questions which discriminated most ruthlessly between the candidates were **1 (e)(vi)**, **1 (h)**, **2 (f)(i)** and **2 (g)(ii)**. A correct answer to **Question 1 (e)(vi)** relied upon candidate understanding that Araucaria was located upstream of the oil spill. Some courage was needed for candidates to answer 'No' after the previous parts of the question had revolved around the widespread effects of the large oil spill; only more able candidates appeared to have the confidence to explain the negative with real clarity. 'Argentina' and 'Brazil' were surprisingly common answers to **Question 1 (h)(i)**, after the question asked for groups of people; having failed to name two groups of people in the first part, it took some time for the answer to **(h)(ii)** to take shape, if it ever did. However, candidates who named two acceptable groups in the first part found it relatively easy to assemble a variety of reasons in the second part. **Question 2 (f)(i)** required levels of knowledge and understanding that many candidates seemed not to possess. Evidence from the majority of answers suggested greater familiarity with the formation of oil itself than with the form of an oil trap. **Question 2 (g)(ii)** required the application of understanding; weaker candidates tended to do no more than describe what the map showed, without any attempt to adapt what they wrote towards the relative usefulness of the different sites for generating electricity from the wind. Able candidates, in contrast, were adept at referring to a variety of sites through which they demonstrated successfully the operation of both negative and favourable factors. As in previous years, candidates appeared to find the use and interpretation of graphs and diagrams easier than that of maps and photographs. With maps, as in **Question 2 (g)(ii)**, there was a widespread inability to make the leap from description of what was there to the statement of reasons as required by the question. Too many candidates ignored what the photograph in **Question 1 (f)** showed; they preferred to carry on using information from the newspaper article as if the photograph had not been included.

### Comments on specific questions

#### Question 1

- (a)(i) 'Next to the river' (or similar) was considered to be the best answer; 'at E' was technically correct, but less good because it represented observation at one place only.
- (ii) This part invited answers such as 'too wet' or 'too great a flood risk', but some candidates left the Examiners to do too much work for them by referring merely to the river or run off without any indication of significance. Those candidates who tried to use letter D and its location missed the point of the question.
- (b) This was one of the best answered questions on the Paper. Many accurately recognised flows **B**, **D** and **E** in part (i); from some Centres virtually every candidate gave these three letters in the correct order, regardless of individual levels of ability. Of the three flows, infiltration was the least well known overall. It was rare for candidates not to gain at least one mark from (b)(ii). Both water taken up by roots and transpiration were widely used in successful explanations. In some Centres candidates used interception to refer to surface or sub-surface blocking of water from the physical presence of either trees or roots, instead of using it in the correct way to refer to leaves intercepting falling rain.

- (c)(i)** Some candidates contrived to make this part a more difficult question by speculating about future changes (i.e. changes during the next ten years), which led to answers that spiralled into irrelevance about over-grazing and over-cultivation leading to desertification. The use of the command word 'Describe' was intended to point candidates towards simple identification of visible changes from Sketch 1 to Sketch 2; when candidates answered in the manner expected, 'woodland replaced by farmland' (although expressed in many different ways) was always included. Some further description, such as the presence of both cultivation and animal farming, gained the second mark. One mark was reserved for mention of changes to the river; this tended only to be claimed by more able candidates, who concentrated their efforts solely upon description of the changes. On Sketch 2 the one place where soil erosion was likely to have increased the most was in the bottom right hand corner, where slopes were steepest and the exposed soil was ploughed down the slope. This needed to be recognised before the mark was awarded to the answer to part **(c)(ii)**, although candidates who extended their shading to include one or more of the other ploughed areas were allowed to keep the mark. Unfortunately the land being grazed at the top of the diagram exerted an over-powerful attraction for weak candidates, which led to wrong answers.
- (iii)** When it came to answering this part many candidates ignored the link statement about the farmer wishing to continue growing crops. Therefore one of the most common answers, 'planting trees', was not the best answer here, although windbreaks and agro-forestry were more acceptable. Of the appropriate answers, contour ploughing was the one seen most frequently; terracing was used less often. Even when no mark was awarded in **(c)(iii)** for applying the answer to the particular example of Sketch 2, some credit was still given in **(c)(iv)** for explanation relevant to a valid method of soil conservation; this allowed a majority of candidates to claim at least one of the two marks. The least successful form of answering was to concentrate upon ways of stopping soil erosion without identification of a method of conservation.
- (d)(i)** Some candidates misinterpreted the needs of this part by answering why irrigation was needed, which either involved reference to sloping areas away from the river or introduced factors for which no evidence was provided such as a dry climate. The fastest route to one mark was to mention the river as a water source, although a few made valid comment about the presence of flat land on the valley floor.
- (ii)** As had been anticipated, most answers given to this part were based upon trickle or drip irrigation, the method named in the syllabus. Some candidates used channel (furrow) irrigation or sprinklers, which in many cases generated equally worthwhile answers. It was surprising how many, with an obvious good understanding of trickle irrigation, managed to lose up to half the marks by drifting into advantages at the expense of continued description.
- (e)(i)** Those candidates who read the newspaper article in full before beginning to answer the various parts of **(e)** seemed most likely to have fared the best. The expected answer to this part was 'Dead fish, birds and mammals', written in the final paragraph; the majority of candidates quoted information from the first paragraph, which led to many lost marks. Although questions are often arranged in the same order as the accompanying information, it is wrong for candidates to assume that this will always be the case.
- (ii)(iii)** Fewer problems were experienced in these two parts which were consistently the best answered parts of **(e)**.
- (iv)** 'The next ten days' was not directly mentioned in the newspaper article; this meant that part **(iv)** was an inherently more challenging question. Using the distances quoted in the article, in association with the stated speed of movement of the oil slick, candidates were able to work out that the oil spill could have reached Uniao da Vitoria in the next ten days. While one mark was used for general references to further pollution of drinking water and damage to animal life, recognition of further damage after it reached the above named town was essential for the award of the second mark.
- (v)** Although a few candidates misinterpreted the needs of part **(v)** by re-stating the answer to part **(iii)**, most managed to find at least one of the three possible reasons quoted in the article.
- (vi)** Top candidates answered this question precisely and well. Middle range candidates frequently seemed to want to say 'no', without being able to convince themselves that the correct answer was anything other than 'yes', judging by the amount of crossing out and changing of answers. Less able candidates began with 'Obviously yes' or a similar statement; for them the amount of pollution referred to in the article represented sufficiently compelling and no further thought was needed.

- (f) Many answers lacked any evidence of direct candidate observation from the photograph; this was a critical weakness, which meant that the majority of answers fell some way short of what was needed for the full three marks. Greater use of map and newspaper article rather than photograph led to much repetition of the pollution based answers from various parts of (e). Many candidates spent too much time referring to location at the borders of three countries and to international disasters that could possibly follow from this. Those candidates, who made it clear that they had observed the large amount of natural vegetation shown on the photograph and had appreciated the scenic beauty of the place, were the ones who gave answers that were most directly relevant.
- (g) Virtually all candidates recognised the link between flowing water and the production of HEP, although there were enormous variations in the strength with which this message was conveyed. Candidates who had looked closely at the photograph before answering undoubtedly fared the best. They were able to make more than one mark-earning point about the amount and volume of water, as well as its great fall and speed of flow in (i), and they could appreciate more readily likely consequences from the loss of natural woodland and scenic beauty in their answers to part (ii). It seemed likely that those candidates who mentioned only 'fast current' in (i) and location at national borders in (ii) had made minimal, if any, use of the photograph, to the detriment of answer quality.
- (h)(i) From candidates in the lower half of the ability range, 'Argentina' and 'Brazil' were almost universal answers to this part. The weakest of these candidates then attempted the impossible by composing answers based on map information from page 8. This led to answers which made no sense about the relative extent of national parks, and presence or otherwise of national park boundaries, hotels and roads between the two countries. Others managed a partial rescue by introducing groups for and against the creation of national parks in the two countries into their answers in part (ii), which led to a good number of two mark answers. When two acceptable groups were named in part (i), such as government, tourists and environmentalists for the creation and local people, farmers and logging companies (and other businesses) against the creation, there was a very high chance of good marks in part (ii). Some excellent answers were seen from able candidates who managed to offer a range of acceptable reasons. A few stopped short of giving the amount of content expected for claiming all the marks in a five mark question. Among those candidates who gained two or three marks for part (h) were some who showed that they did not fully appreciate the purpose of national parks. They viewed their creation solely in terms of encouraging tourism, without showing any awareness of their role in wildlife, habitat and environmental preservation. This narrowed the range and content of their answers.

It was clear that the majority of candidates found the questions within parts (a)-(d) easier than those from (e)-(h). A few, after having struggled to score in parts (f) and (g), managed to end strongly with an effective two-sided answer to part (h). This contrast in performance between the first and second halves of **Question 1** was not noticed among candidates who scored thirty or more marks. They accumulated marks throughout, with only occasional answers that failed to satisfy entire question needs.

## Question 2

- (a)(i) Despite being the easiest question in the examination, a few candidates still named one of the fossil fuels other than coal. Some merely re-phrased the 'will not last for ever' part of the question and failed to score in (a)(ii) as well; most, however, stated that they were 'non-renewable' and laid claim to the first mark. The second mark was harder to earn; this was done either by comment about the millions of years it takes for fossil fuels to form, or about the speed at which fossil fuels are being used up.
- (b)(i) As was expected, two mark answers were the norm for this part, although occasionally carelessness in plotting one of the bars led to the loss of a mark by both strong and weak candidates alike. Drawing three of the bars did not stop a few candidates from completing the graph with a line.
- (ii) Despite the variety of solutions offered, a clear majority attempted to plot a divided bar graph as required; mistakes were only occasional and often minor when the correct method was being used. The two most common alternative solutions were separate bar graphs for the five types of energy, with each bar drawn horizontally from the base at 0, and separate segments all beginning at 0 and ending at a maximum of 3,400. If the latter method was used, how and where to shade the different energy segments in order to match the shading in their key posed quite a problem for candidates. Over the years there has been a great improvement in both accuracy of construction of graphs and neatness of shading, even though some candidates continued to use a pen for all or some of the shading, with adverse effects upon appearance and effectiveness of the finished graph.

- (iii) Hydro-electric was (not surprisingly) the more popular choice, although many candidates had difficulty expressing reasons in clear terms for the low amount; reasons were more often hinted at instead of being stated effectively. Some candidates mis-read the question and gave the advantages of HEP. The choice of nuclear power was often a positive one, which led to a higher proportion of three mark answers. A greater amount of specific knowledge was incorporated in their answers, such as named examples of explosions and details about radiation dangers.
- (c) There were enormous variations in standards of answering to both (c)(i) and (c)(ii). Those who appeared to have no knowledge of mining methods merely stated what was could be seen on the diagrams, in no particular order; the more they wrote, the more clearly they exposed their lack of understanding of mining methods. At the other end of the scale, those candidates who showed from the beginning of their answers that they recognised the differences in procedures between deep and opencast mining, and arranged mining activities in order, scored well. Also a few were able to include details additional to those shown in the diagrams, such as methods used in opencast mining for clearing the soil and breaking up the coal seam, which were helpful, even if not essential for the award of full marks.
- (d)(i) Answers based upon the choice of diagram B were much easier to compose. B was chosen by the majority of candidates, although many of the answers were slightly disappointing because the focus upon 'cheaper' was less strong than was desirable. There tended to be little comment about why opencast mining was cheaper even, when relevant content was included. A high percentage of answers contained irrelevant references to 'less dangerous' and 'more healthy'; as these formed the themes for two later questions it was unlikely that they would also be given credit here.
- (ii) In contrast, this was one of best answered questions; it soon became clear that a variety of problems associated with underground mining were widely known, even if 'earthquake' was over-used as the cause of rock falls and roof collapses.
- (iii) This part was equally well answered; the focus of most answers was upon the effects of opencast mining on the environment. The only regular weakness was digression into environmental effects resulting from the burning of fuels such as coal.
- (e)(i) For answering this part the syllabus offered headings such as landscaping, restoration and reclamation. A clear majority of candidates were able to describe at least one measure which matched one of these headings. Replanting, replacing the soil and levelling the site once cleared were the ones referred to most.
- (ii) This was the most open part of this question. Answers of 'yes', 'no' and 'maybe' were equally valid, which meant that the answer's value was controlled by the worth of the explanation. This question stimulated some interesting and well argued answers from more able candidates, many of them worth more than the two marks available for the answer. Weaker candidates typically supported their view with only one supporting statement and sometimes did little more than repeat what they had written in the previous part.
- (iii) Answers almost invariably included a reference to breathing problems, which claimed one of the marks; damage to hearing from noise, and pollution of waters used for drinking, were among the other most frequent answers that earned the second mark. A few answers went too far for the question by repeating some of the content in the answer already given to (d)(ii), when candidates referred to mining problems leading to death rather than injury or illness.
- (f)(i) As mentioned in the introduction to this report, this part turned out to be a difficult question, perhaps the most difficult one on the Paper. One mark answers were reasonably common among candidates in the middle and upper levels of the ability range, typically for recognising that the oil was trapped by two layers of impermeable rock, one above and one below, although it was rare for it to be stated in such explicit terms. Only a tiny minority of candidates had the understanding to note that the oil occupied the spaces within the porous rock or that the rocks had been folded up.
- (ii) This was an easier question. Most answers were based upon oil being a liquid and coal a solid, supported by comment about how this made mining cheaper for oil than coal. Inclusion of Diagrams A-C in the question triggered another common response - that oil can be drilled and sucked out from the surface, whereas men and equipment need to go underground for coal. Weaker answers, not worth a mark, were derived from the oil appearing to be near to the surface in Diagram C, at the top of the layer of porous rock.

- (g)(i) Apart from the minority who attempted to bring water and heat into their answers, the rest understood how power could be generated by wind, even if the wind turbines shown and their blades were referred to by a many different names.
- (ii) There was an enormous variation in quality of answers to this part, very dependent upon candidate ability and level of understanding. Some candidates merely stated heights and locations from the map, without being able to comment on their significance for wind power; most answers of this type failed to score any marks. Others gave general answers; for example it was suggested that higher winds were more likely on high ground and/or in coastal locations, but none of the four sites were referred to in order to illustrate this. For this type of answer the maximum allowed was two marks. More able candidates used the letters to exemplify sites where much power was likely to be generated. The maximum mark for these answers was three, until and unless they also referred to a site that was less favourable. Site A was the obvious choice of a less good site; relevant factors referred to most were shelter, noise and TV reception. References to at least one site that was better and another that was less favourable were the key to generating a full mark answer. Overall this final question elicited an enormous variety of answers. However, candidates who argued in terms of better sites close to the settlement produced largely unsuccessful answers, because the map scale shows that distances are small.

On average in **Question 2** there was a rapid collection of marks from parts **(a)** and **(b)**; this slowed down a little in part **(c)** before picking up again in parts **(d)** and **(e)**. Consistency in answering well all the different parts of **(f)** and **(g)** was less easy, although some of the more able candidates demonstrated that it could be done.

**Paper 0670/04**

**Paper 4 - Alternative to Coursework**

### **General comments**

Overall the candidates were able to give sensible answers to all the questions. There were some thoughtful responses with good justifying comments. However, at times, candidates did not seem to have read the question carefully enough which lead to the use of memorised phrases, without placing this in the context of the question.

The Examiners were disappointed to see that some candidates demonstrated little understanding of the basic methods of practical investigations. Centres must recognise that this Paper is an alternative to coursework, so questions about practical work will be part of every Examination Paper. The mark scheme is published and the comments that follow do not cover every alternative marking point.

### **Comments on specific questions**

#### **Question 1**

- (a)(i) The map and scale in Figure 2 were only used by a small number of candidates to give a length for the country. Many candidates simply copied a figure directly from the question, such as 48km.
- (ii) The rainy season was often given correctly. However some candidates copied the dry season from the question.
- (b)(i) Many candidates appreciated that cash crops gave farmers income, but they often failed to gain the second mark by not giving a use of the money in the context of farming.
- (ii) Candidates found it difficult to suggest that there was a very long border between the countries or that patrolling the border was going to be difficult. Most answers were too vague to gain credit.



## Question 2

- (a) The materials gained from the profile were usually stated correctly.
- (b) Candidates often suggested, correctly, that there would be conflict between the people digging in the quarry. Only a small number of candidates referred to the dangers to other quarry workers; the Examiners expected this point to be made more frequently. Some candidates referred to 'using up topsoil' or 'soil will be exhausted' without any further detail so they could not gain credit.
- (c) Most candidates gave the correct answer of 10 days.

## Question 3

- (a) The Examiners were disappointed to see that only a minority of candidates understood the idea of a representative sample. Too many suggested all 350 quarry workers should be questioned.
- (b) Many candidates gave good questionnaire style questions that could have been used to gather the data in Figure 4.
- (c) Candidates seemed to find it harder to ask two more questions of their own, even if they had given good clear answers to part (a). There were many opportunities to ask about age or working hours or size of family. All reasonable questions were given credit. Repetition of questions directly relating to data in Figure 4 were not given any credit.
- (d) Candidates were asked to suggest pull factors that would have caused the population of the town to increase. Increased job opportunities and a better standard of living were often given. Unfortunately too many candidates considered the reproductive potential of the tourists and the local people, this did not gain credit.

## Question 4

- (a) The average minimum temperatures were usually given correctly.
- (b)(i) The average rainfall total for one year was often correctly given. Some candidates divided the total by 12 to give the monthly average, which was not required.
- (ii) The correct answer of 40% was often given
- (c) Tourists were most likely to visit in the months of only medium discomfort. Some candidates picked other months that they thought were appropriate.

## Question 5

- (a) There were many good references to hunting, poaching and habitat destruction. However some candidates wrote about the increase in human population even though this was excluded by the way the question had been asked.
- (b) Many candidates referred to attracting tourists and income. Many discussed breeding lions even though the question clearly stated that only one lion was placed in the reserve. The educational value of the lion was often overlooked.
- (c) Candidates were asked to suggest how visitors could be controlled in the reserve and the Examiners were pleased to see a wide variety of good ideas and some further details given.

## Question 6

- (a)(i) Candidates often seemed to have difficulty carrying out the instruction to draw a straight line between the top of plant A and B. The Examiners concluded there must be some confusion between the meaning of 'straight' and 'horizontal' as large numbers of horizontal lines were given as an answer.
- (ii) This question asked the candidates to describe the trend shown by the line, fortunately many still recognised and stated the decrease in height between plant A and B even if they had drawn a horizontal line in part (i).

- (b) Candidates found it difficult to suggest why plant X and Y did not fit the trend due to lack of nutrients or water. Genetic factors are actually the most likely reason but it was rarely suggested.
- (c) Candidates either clearly understood the question and gave three good answers such as keeping the size of each field the same, or they made vague suggestions about climatic conditions.
- (d)(i) Candidates could have suggested plan A or B with a supporting reason such as only a small number of plants were measured.
- (ii) Plan C should have been suggested because height of plant and length of cob were measured, there were many measurements taken, so averages could be found, other points were also given credit as well.
- (e)(i) Most graphs were well presented. The Examiners were pleased to see that most labels of axes had the correct units given.
- (ii) Many candidates did not give clear answers here. The table of data and the graph showed the millet height stopped being influenced by the trees between 5 to 7 metres from the tree.
- (f) Most candidates gave a good diagram of nine trees well spaced.

### **Question 7**

All the information needed to gain maximum marks could be found within the diagram and information given. Candidates were given credit for applying their own knowledge and understanding where appropriate.

- (a) Proposals three and four should have been selected, each with a justification. Many candidates gained four marks.
- (b) Proposals one and two should have been selected each with a justification. Again many candidates gained four marks.