



General Certificate of Education
Advanced Subsidiary Examination
January 2009

General Studies (Specification A)

GENA2

Unit 2 AS Science and Society

Thursday 8 January 2009

1.30 pm to 3.00 pm

For this paper you must have:

- a Source Booklet for Section A (enclosed)
- an objective test answer sheet for Section A
- a 4-page answer book for Section B.

You may use a calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen.
- Write the information required on the front of your answer book for Section B. The **Examining Body** for this paper is AQA. The **Paper Reference** is GENA2.
- Answer Section A (Questions 1.1 to 1.30) using the answer sheet provided **and one** question from Section B (Question 2, 3 or 4) in your separate answer book.
- Do all rough work in your answer book.
- Hand in **both** your answer sheet **and** your answer book separately at the end of the examination.

Information

- The maximum mark for this paper is 65.
- This paper consists of two sections.
Section A contains 30 objective test questions based on the Source Material in the separate Source Booklet. There is 1 mark for each question. You will not lose marks for wrong answers.
Section B contains three alternative structured questions. Marks are shown after each question and total 35.

SECTION A

There is 1 mark for each question.

Read the passage entitled **Careless science costs lives** which is printed in the separate Source Booklet and answer **Questions 1.1 to 1.30** by choosing the answer represented by the letter **A, B, C** or **D** that you think best. Mark your responses on your objective test answer sheet.

- 1.1** Which of the following caused people to lose trust in government scientists?
- A** denying the link between BSE and CJD
 - B** banning smoking in public places
 - C** advising people to eat fruit and vegetables
 - D** advising limits on alcohol intake
- 1.2** Rachel Carson (paragraph 2 and **Box 1**) opposed
- A** all chemical pesticides.
 - B** any insect control.
 - C** selective use of pesticides.
 - D** indiscriminate use of pesticides.
- 1.3** The reason that DDT is used to prevent malaria in some countries (**Box 2**) is because it
- A** is the only substance that works.
 - B** is inexpensive.
 - C** is persistent.
 - D** accumulates in the body.
- 1.4** Which of the following statements describes the effect of DDT on US citizens in the middle of the twentieth century (**Box 2**)?
- A** DDT contributed to the rise in the proportion of US citizens described as being fat.
 - B** Thin eggshells prevented many US citizens from buying eggs in their weekly shopping.
 - C** A significant number of US citizens accumulated DDT in their bodies.
 - D** The majority of US citizens chose to buy food which was not contaminated by DDT.
- 1.5** A build-up of pesticides in the soil can lead to high levels of these in vegetables such as carrots. To minimise such a build-up, which of the following is the best to use?
- A** benzene hexachloride
 - B** chlordane
 - C** dilan
 - D** DDT

- 1.6** If the rate of decline in pesticide were linear, dilan (**Figure 1**) would decline each year by approximately what percentage of its original amount?
- A** 0.2 %
 - B** 0.6 %
 - C** 1.6 %
 - D** 5.5 %
- 1.7** Biomagnification (**Figure 2**) is the accumulation of a substance up the food chain through the
- A** transfer of that substance in organisms that are food for other organisms in the chain.
 - B** manufacture of that substance in organisms that are food for other organisms in the chain.
 - C** transfer of that substance from the top of the food chain to the bottom.
 - D** manufacture of that substance in organisms that cohabit with the other organisms in the chain.
- 1.8** In **Figure 2**
- 1** the dots represent an amount of pesticide.
 - 2** the dots represent the number of organisms.
 - 3** the horizontal length of the bar represents the amount of pesticide.
 - 4** the horizontal length of the bar represents the number of organisms.

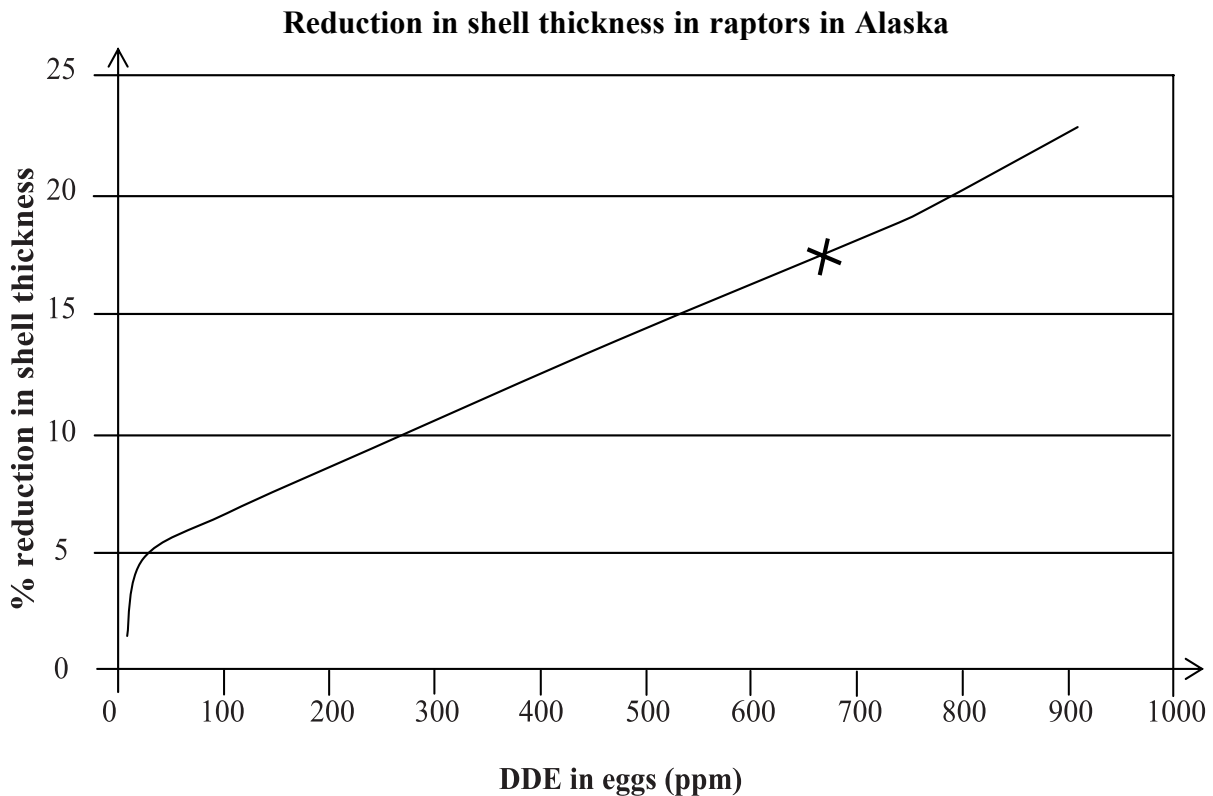
Answer

- A** if **1** alone is correct.
- B** if **2** alone is correct.
- C** if **1** and **4** only are correct.
- D** if **2** and **3** only are correct.

Turn over for the next question

Turn over ▶

- 1.9 Which bird is represented (and at which site) by point **x** on the graph of data taken from Figure 3?



- A Rough-legged hawk (Alaskan tundra North slope)
 B Gyrfalcon (Seward Peninsula)
 C Peregrine falcon (Alaskan tundra North slope)
 D Peregrine falcon (Central Alaska)
- 1.10 If a peregrine falcon living in a pollution-free environment laid eggs with shells 0.5 mm thick, what would be the likely thickness of an egg shell laid by a peregrine falcon in Central Alaska (Figure 3)?
- A 0.08 mm
 B 0.39 mm
 C 0.42 mm
 D 0.46 mm
- 1.11 The peregrine falcon accumulates more DDT in its fat than the other species studied in Alaska. Which of the following statements provides the most likely explanation?
- A The rough-legged hawk eats mainly rabbits and small mammals.
 B The peregrine falcon eats other smaller birds.
 C The gyrfalcon eats hares and grouse.
 D The peregrine falcon eats only insects.

1.12 There is no evidence that DDT causes cancer (paragraph 3); therefore we can conclude that DDT

- A** is harmless to humans.
- B** does not kill insects.
- C** is harmless to the environment.
- D** may be safe to use.

1.13 Which of the following is/are true?

Anti-capitalists (paragraph 4)

- 1** support the profit motive.
- 2** are against multi-national companies.
- 3** do not use antibiotics.

Answer

- A** if **1** alone is true.
- B** if **2** alone is true.
- C** if **1** and **2** only are true.
- D** if **2** and **3** only are true.

1.14 Which of the following statements (paragraph 4) is expressing an opinion rather than a fact?

- 1** Self-interest benefits the public as effectively as philanthropy.
- 2** Multi-nationals have developed antibiotics and vaccines that have cured diseases.

Answer

- A** if both are opinions.
- B** if **1** alone is an opinion.
- C** if **2** alone is an opinion.
- D** if neither is an opinion.

1.15 Some politicians have claimed that scientists say that GM foods are safe to eat. Which is the most appropriate scientific response?

- A** There is no evidence at present to indicate that GM foods are harmful to human health.
- B** The evidence indicates that GM foods are harmless to human health.
- C** The evidence indicates that GM foods, like other foods, are beneficial to human health.
- D** There is no evidence that GM foods are any different from other foods.

Turn over ►

1.16 Each of the following statements is an example of good science **except**

- A experiments can be reproduced to give the same results.
- B findings do not change over time.
- C work is reviewed by senior scientists.
- D researchers declare themselves to be value-free.

1.17 Peer review (paragraph 5) means that the work will be reviewed by

- A senior scientists in the same discipline.
- B members of the House of Lords.
- C the scientist's managers.
- D the scientist's students.

1.18 'reproducible' (paragraph 5) means

- A another experimenter has got similar results.
- B other scientists agree that the hypothesis is sound.
- C the experiment will always give the same, or similar, results.
- D the results have been quoted by other scientists.

1.19 In paragraph 5 the author expresses his view that the motives of a scientist are irrelevant to the validity of science.

However, if the results of a scientist's work did not agree with the interests of his/her employer they might be

- 1 suppressed by their company, an NGO or a government.
- 2 presented in a misleading way.
- 3 used inappropriately by his/her employer.

Answer

- A if 1 and 2 only are correct.
- B if 1 and 3 only are correct.
- C if 2 and 3 only are correct.
- D if all are correct.

1.20 According to **Box 4** Sense About Science is

- A an independent group of scientists.
- B a group promoting genetic modification.
- C a group campaigning against bio-technology.
- D directed by Lord Dick Taverne.

- 1.21** Using the 'precautionary principle' (**Box 4**) with regard to GM crops we would
- A** keep them pesticide-free.
 - B** wait to see if they are safe.
 - C** use them only for animals.
 - D** ban them completely.
- 1.22** The greatest increase in the average level of DDT in human body fat for those living in the US (**Figure 4**) occurred between
- A** 1942 and 1950.
 - B** 1950 and 1956.
 - C** 1956 and 1962.
 - D** 1963 and 1968.
- 1.23** In the source it is argued that DDT is beneficial to humans
- A** because claims of damage to the liver and of cancer are not substantiated.
 - B** because it has significantly reduced the number of deaths from malaria.
 - C** when it is used by multi-national companies to produce antibiotics.
 - D** because it demonstrates how properly applied science always saves lives.
- 1.24** Overall the source says that
- 1** good science is reproducible.
 - 2** good science can be achieved with a variety of motives.
 - 3** we sometimes accept bad science from NGOs.
 - 4** we sometimes reject good science from industry.

Answer

- A** if **1** and **2** only are correct.
- B** if **3** and **4** only are correct.
- C** if **1**, **2** and **3** only are correct.
- D** if all are correct.

- 1.25** The author regards Rachel Carson as having

	science	motives
A	good	good
B	bad	good
C	good	bad
D	bad	bad

Turn over ▶

1.26 The author says each of the following **except**

- A** people sometimes do not trust scientists.
- B** you have to have good motives to do good science.
- C** people often do not trust industries.
- D** environmental NGOs are generally seen to have good motives.

Assertion / Reason questions

For Questions **1.27** to **1.30** you are given an assertion followed by a reason. Consider the assertion and decide whether, on its own, it is a true statement. If it is, consider the reason and decide if it is a true statement. If, and only if, you decide that *both* the assertion and the reason are true, consider whether the reason is a valid or true explanation of the assertion. Choose your answer (**A** to **D**) as follows and indicate your choice on the answer sheet.

	Assertion	Reason	Argument
A	True	True	Reason is a correct explanation of assertion
B	True	True	Reason is not a correct explanation of assertion
C	True	False	Not applicable
D	False	—	Not applicable

ASSERTION

REASON

- | | | | |
|-------------|--|---------|--|
| 1.27 | Scientists' claims can never be entirely value-free | because | scientists cannot escape the influence of their culture. |
| 1.28 | DDT is banned in the USA | because | DDT is proven to cause cancer. |
| 1.29 | Although banned in most Western countries, DDT is still widely used in LEDCs | because | the problems caused to humans by DDT only occurred in the USA. |
| 1.30 | Dick Taverne's article may be biased | because | he is a lobbyist for GM companies. |

END OF SECTION A

SECTION B

Answer **one** two-part question only from **2, 3** and **4**.

Wherever possible **use your own words** to show you understand the arguments.

You will be marked on your ability to use good English, to organise information clearly and to use specialist vocabulary where appropriate.

EITHER**2**

In 2006 a major port company made land available for a significant investment in new storage facilities by retailing giant ASDA for the development of a £20m import centre at Teesport. This successful development means that 70% of ASDA's non-food imports now go directly to the North by sea, rather than by road from Felixstowe, saving ASDA more than 2 million road miles each year – that's equivalent to four trips to the Moon and back – while improving ASDA's reputation, efficiency and environmental standing.

Moving goods by water is cost-effective, particularly over long distances, which is reflected in the fact that 95% of UK imports come via the UK's ports. A water network is available and accessible already. In the UK the opportunity is limitless with more than 2 000 miles of rivers, estuaries and canals and 11 072 miles of coastline connecting to 300 ports.

Source: Adapted from case study, 'Thanks to ASDA it's greener up North', www.seaandwater.org

- (a) Explain why the use of water transport might improve a company's 'environmental standing'. *(17 marks)*
- (b) Discuss the social and economic issues affecting the transport of freight by road, rail and air. *(18 marks)*

Turn over for the next question

Turn over ►

OR

3

“Is it safe for children to use mobile phones and should phone masts be located near places where children gather?”

There is no data available to suggest that the use of mobile phones by children is a health hazard. The time in children’s development when they might be particularly vulnerable to RF (radio frequency) exposures to the head is when they are aged two years and younger. In the UK and Sweden the authorities recommend a precautionary approach to either minimise use (essential calls only) or minimise exposure (use a hands-free kit). In the Netherlands, however, the use of mobile phones by children is not considered a problem.

There is no established scientific basis or evidence of adverse health effects affecting children or adults as a result of their exposure to mobile phone base stations. This applies irrespective of the location of the phone mast.

Source: Adapted from ‘Expert Group on Health Effects of Electromagnetic Fields’,
Government of Ireland, March 2007

- (a) Explain why the operation of mobile phone systems has given rise to concerns about their use. *(17 marks)*
- (b) Discuss the obligations of scientists, politicians and others in taking a ‘precautionary approach’ to new technological developments. *(18 marks)*

OR

4

Collectively, the people of Britain are healthier now than at any other point in history. We are living longer and have more years of good health than ever before. But whilst overall health has been improving, the health of the least well off has been improving more slowly than that of the rest of the population. Tackling the causes of health inequalities requires a different approach to simply tackling the causes of ill health.

Health is influenced by many factors including individual behaviour and access to health services as well as the wider determinants of health such as income, employment, housing and environmental factors. Tackling health inequalities is therefore about tackling the unequal distribution of these health determinants within the population. It is about ensuring a fairer and more equal society, where people with the least access to resources and opportunities are able to enjoy the standard of living and the opportunities that many take for granted.

Source: Adapted from 'Annual Report 2005', Director of Public Health, Middlesbrough Primary Care Trust

- (a) Explain the kinds of 'individual behaviour' that are necessary to maintain good health. *(17 marks)*
- (b) Discuss ways in which the 'causes of health inequalities' might be tackled. *(18 marks)*

END OF QUESTIONS

There are no questions printed on this page

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