OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

GENERAL STUDIES 2962

The Scientific Domain

Monday **16 MAY 2005** Afternoon 1 hour 15 minutes

Additional materials:
Answer Booklet.

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the spaces provided on the answer booklet.
- Answer **all** the questions in Section A and **one** question in Section B.
- Read each question carefully and make sure you know what you have to do before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 100.
- **Where an answer requires a piece of extended writing, the quality of your written communication will be assessed, including clarity of expression, structure of arguments, presentation of ideas, grammar, punctuation and spelling.**
- You may use an approved calculator.

This question paper consists of 5 printed pages and 3 blank pages.

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Section A

Answer **all** questions in this section.

1 **(a)** The probability of an event is a measure of how likely it is to occur. It can be written as a fraction, a decimal or a percentage e.g. the probability of getting a tail if a fair coin is tossed can be written as $^1/_2$, 0.5 or 50%.

(i) Write down, as a percentage, the probability that a number chosen from 3, 4, 5, 6, and 7 will be even. [1]

(ii) Two fair coins are spun. Write down, as a decimal, the probability of spinning two heads. [1]

(b) **(i)** Calculate the next two numbers in each of the following sequences

- 1, 4, 9, 16, 25, 36, …, …,
- 1, 1, 2, 3, 5, 8, 13, 21, …, …, [4]

(ii) The nth term of a sequence of numbers is $2n^2 + 4n + 2$. Find the third term in the sequence, where n=1 gives the first term. [2]

(c) The astronomer, Bode, developed a formula called Bode's Law. This states that

$$d = \frac{(x + 4)}{10},$$

where d is the mean distance from the Sun to a planet, measured in Astronomical Units (AU).

One Astronomical Unit is equal to the mean distance from the Sun to the Earth i.e. d = 1 for the Earth and x is a constant for each planet.

(i) For the planet Venus, x = 3. Find the distance from the Sun to Venus in AU. [2]

(ii) The planet Jupiter is 5.2 times as far away from the Sun as the Earth. Find the value x for Jupiter. [2]

(iii) For the planet Mars, x = 12. Given that the Earth has a mean distance from the Sun of 9.3×10^7 miles, calculate the mean distance in miles between the Sun and Mars. [3]

(d) There was a man who had a sack of corn, a goose and a fox. He came to a river where he found a small boat which was only big enough to hold himself and one other thing. He had to get everything across the river both safe and dry. He had a dilemma. He could not leave the fox alone with the goose nor could he leave the goose alone with the corn.

(i) Using the minimum of journeys possible, describe the stages needed in order for the man to get himself and all his belongings safely across the river. [6]

(ii) Justify why this problem is clearly defined. [2]

(iii) How might problems similar to this be applied to real life situations? [2]

Total [25] marks

2 You are required to investigate a proposal to introduce traffic calming measures along a stretch of road within a residential area.

(a) Design an experiment which will determine the average speed of motor vehicles using the stretch of road. [12]

(b) Suggest how you would assess the extent of public support for the introduction of traffic calming measures. [8]

(c) Outline and justify the inclusion of **one** other factor which you might need to consider in relation to the proposal. [5]

Total [25] marks

Section B

Answer **one** question from this section. Answers must be in continuous prose.

3 **(a)** Suggest **three** ways in which changes to the birth rate and death rate shown in Fig. 1 affect natural population growth. [10]

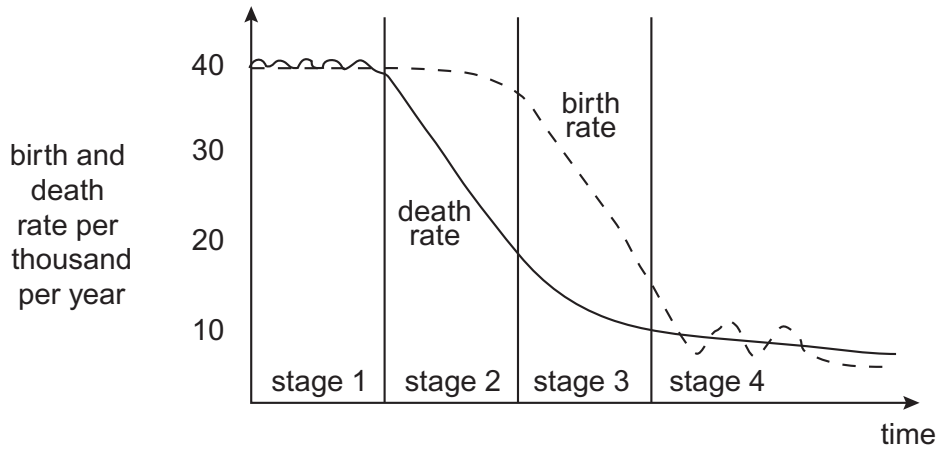

Fig. 1

(b) The world's population continues to grow at a fast rate and by 2050 may exceed 10 billion (10,000 million). A 1970s view of how to limit population growth and control human fertility involved compulsory constraints, increased contraception, restrictions, limitations and deterrents.

Discuss the methods which might be employed to manage population change in the 21st century. Give examples from rich **and** poor countries. [40]

4 **(a)** Using examples, distinguish between biotechnology and genetic engineering. [10]

(b) In a recent advertisement, a genetics research group stated 'using our state-of-the-art technologies, you can quite possibly ensure that your child's life will be free from such diseases as cancer, Alzheimer's, and heart disease – as well as conditions like obesity, aggression and dyslexia'.

To what extent do the advantages of genetic engineering outweigh its dangers? [40]

5 **(a)** Explain how each of the five representations of scale shown in Fig. 2 could be used. [10]

1:100 000

x100

$^{1}/_{10}$

Fig. 2

(b) Using examples show how the mathematical techniques and skills taught in schools and colleges are applicable to everyday life. [40]

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