ADVANCED SUBSIDIARY GCE

GENERAL STUDIES

The Scientific Domain

F732

INSTRUCTIONS TO CANDIDATES

*   Write your name clearly in capital letters, your Centre Number and Candidate Number in the spaces provided on the Answer Booklet.
*   Read each question carefully and make sure that you know what you have to do before starting your answer.
*   If you use additional sheets of paper, fasten the sheets to the Answer Booklet.
*   Answer **all** questions in Section A and **one** question in Section B.
*   Do **not** write in the bar codes.

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 **60**.
*   You are advised to divide your time equally between Sections A and B.
*   **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.**
*   This document consists of **4** pages. Any blank pages are indicated.

A calculator may be used for this paper

Turn over

Section A

Answer **all** the questions in this section.

1   Fig. 1 is a diagram of a sound wave.
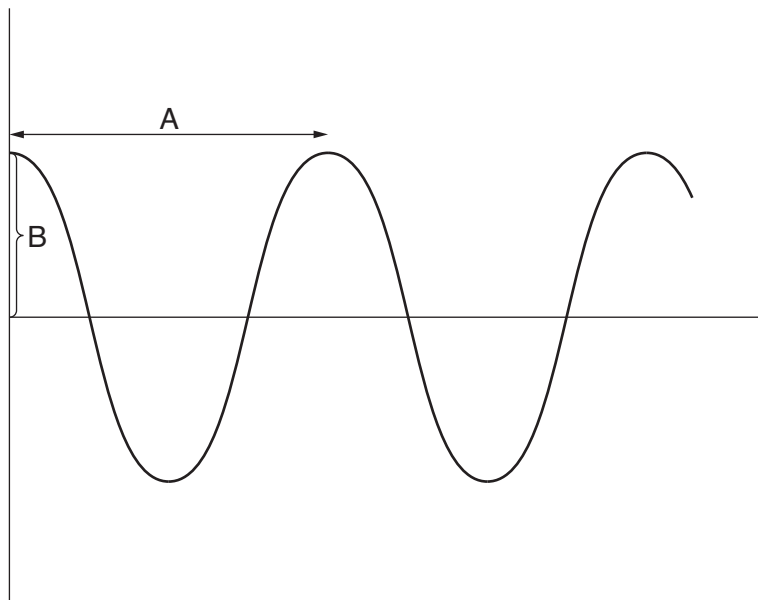

Fig. 1

(a)   Identify the labels A and B using the words wavelength and amplitude.   **[1]**

(b)   The speed of sound (V) is defined by the distance that the wave moves in one second. Experiments show that:

$$V = \lambda \times f$$

where
λ is the wavelength of the wave (measured in metres)
f is the frequency, and is the number of waves per second (measured in hertz (Hz)).

Calculate the speed of sound if your instruments measure a frequency of 10 000 Hz and a wavelength of 0.0343 metres.   **[4]**

(c) (i)   Echoes can be used to measure the speed of sound.

Describe how you could obtain an approximate reading for the speed of sound by using a tall building, a 100 metre tape and a digital stop watch.   **[8]**

(ii)   Suggest **two** ways to improve the accuracy of your results.   **[4]**

(d)   When an aircraft flies past overhead the sound seems to come after the plane has passed. Explain this phenomenon.   **[3]**

2   In the days before refrigerators families would shop frequently for food. One family purchased milk every second day, bread every third day, fruit every fourth and meat every fifth. Assume on Day 0 they have shopped for all four items.

    (a)   On which day would they shop for all four items again?   **[5]**

    (b)   On how many days in this period were none of these foods purchased?   **[5]**

Section A Total [30]

Section B

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

3 Some experts estimate that the UK will need to increase its sources of energy by 20% in the next ten years. A number of plans have been proposed to close this energy gap. Examine the relative disadvantages of **each** of the following:

- coastal nuclear power stations
- renewable energy sources such as wind farms, solar panels and tidal barriers
- coal fired power stations close to known coal reserves. **[30]**

4 Scientists have contributed solutions to many medical problems. Current problem areas include:

- finding cures for breast cancer
- improving fertility for males and females
- treating dementia in the elderly
- developing vaccines to combat HIV and Aids.

Funds for medical research are limited.

Select **two** of these problem areas. Argue the case for giving **one** of them priority over the other for funding. **[30]**

5 In a library the books are usually classified using the Dewey system. Rocks can be classified using the geological time scale and organisms using the Linnaean system.

A good classification has the following features:

- members of a class should have maximum similarity
- there is maximum difference between the different classes
- the items being classified should only fit into one class
- each class should have a clearly identified label
- there should not be many classes with one or few members.

Suggest **three** reasons for scientists wanting to classify their observations and measurements of such things as rocks, organisms, clouds and chemicals. Describe **two** difficulties they may encounter when using a classification. **[30]**

Section B Total [30]