Cambridge Assessment International Education

Cambridge International AS & A Level

THINKING SKILLS **9694/23**

Paper 2 Critical Thinking **May/June 2022**

1 hour 45 minutes

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You must answer on the enclosed answer booklet.

You will need: Answer booklet (enclosed)

INSTRUCTIONS

- Answer **all** questions.
- Follow the instructions on the front cover of the answer booklet. If you need additional answer paper, ask the invigilator for a continuation booklet.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **8** pages. Any blank pages are indicated.

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Section A

Study the evidence and then answer Questions 1 and 2.

Source A

Extract from book *The Future of Nuclear Energy*

Nuclear power is a controversial alternative to fossil fuels as sources of energy. It is, in principle, obtainable through two methods: nuclear fission and nuclear fusion.

Nuclear fission is an established technology and is used in many countries throughout the world. However, the main objection to it is the problem of what to do with the radioactive waste which is produced by the process. This waste can remain radioactive for many thousands of years, so disposing of it is a key problem. Solutions to this problem, such as burying it or dumping it at sea, cause uneasiness in some people, who fear accidental leakage of such waste. These fears have been reinforced by a number of high-profile accidents at nuclear power plants, most notably at Chernobyl in Ukraine in 1986 and Fukushima in Japan in 2011. Some countries have abandoned nuclear power as a source of energy.

The process of nuclear fusion does not produce radioactive waste but scientists are a long way from harnessing its energy in a viable manner. Nuclear fusion requires high temperatures and occurs naturally in stars like the Sun. At the moment, any technology that was able to produce such high temperatures would use up far more energy than was emitted by the fusion process.

Source B

Extract from science journal

Scientists are working on making nuclear fusion a viable energy source. They have been able to achieve a fusion reaction in research facilities, using highly specialised equipment to produce temperatures of around 100 million degrees, at which the fusion process can occur. The main barrier to a sustained reaction, other than the high cost of the electricity needed, is finding a material that can withstand that much heat for more than a few seconds.

Fusion researchers believe that more time and support are all that scientists need to make nuclear fusion a large scale means of energy production. For $20 billion, they claim they could build a working reactor. It would be big, and maybe not very reliable, but 25 years ago scientists didn't even know if they would be able to make fusion work. Now, the only question is whether it is affordable.

Source C

Extract from book *The Quest For Cold Fusion*

In 1989, two scientists claimed they had succeeded in producing fusion in the laboratory using low temperatures – a process known as 'cold fusion'. This was a significant breakthrough, given the practical difficulties in producing 'hot' nuclear fusion. However, the promise of nuclear fusion as a source of unlimited cheap green energy has not been realised. This is because nobody else has been able to replicate the original experiment that had supposedly produced cold fusion. Whilst a minority of scientists still think cold fusion is possible, the vast majority of the scientific community have abandoned the idea.

Source D

Extract from journal article 'Nuclear Power Policy in Europe'

Belgium, Switzerland and Germany plan to phase out the use of nuclear power as a source of energy as soon as possible. In contrast, France gets 72% of its energy from nuclear power, Slovakia gets 55% and Hungary 51%. None of these countries has plans to phase out nuclear power in the near or medium future.

Source E

Extract from leaflet produced by nuclear energy suppliers

Nuclear power is a vital source of 'green' energy, i.e. energy that does not use fossil fuels and therefore does not contribute to global warming through the emission of carbon dioxide. Unlike solar or wind power, it is not dependent on the weather and therefore can be used anywhere in the world to supply an uninterrupted energy stream. At present nuclear power is produced through the process of nuclear fission. There are problems associated with the disposal of radioactive nuclear waste produced as a by-product of the fission process, but there are solutions. In the distant future, nuclear fusion may be a possible alternative to nuclear fission, but the world needs green sources of energy now.

1 **(a)** **(i)** How reliable is Source E? [2]

(ii) Source E claims that there are solutions to the problems associated with nuclear fission as an energy source.

Explain **one** way in which this claim is weak. [1]

(b) Look at Source A. To what extent does the evidence about nuclear accidents justify fears about methods of nuclear waste disposal? [3]

(c) Suggest **three** explanations for the differences in policies on nuclear power illustrated by the information in Source D. [3]

(d) "Now the only question is whether it is affordable" (Source B). Explain how the evidence in Source A could be used to challenge this claim. [3]

(e) Is Source E an argument? Explain your answer. [2]

2 *You are advised to spend some time planning your answer before you begin to write it.*

'Nuclear energy will be a major contributor to green energy production.'

To what extent do you agree with this claim? Write a short, reasoned argument to support your conclusion, using and evaluating the evidence provided. [8]

Section B

Read the following passage and then answer Questions 3, 4 and 5.

1 Modern technology such as video conferencing means it is no longer necessary for people to have face-to-face work meetings. As a result, we no longer need to travel to such meetings. Whilst there are still some technical problems with video conferencing, solutions will be found in the future and people will soon adjust to this way of working. So we do not need to travel in order to meet people.

2 Travel must cease to be a central feature of modern life. Global travel is a key factor in the spread of disease and the creation of pandemics, such as the coronavirus in 2020. The control of the spread of such diseases would be much easier if people did not travel. So not travelling would make a major contribution to avoiding such devastating pandemics in the future. The economic benefits of such avoidance would far outweigh any economic disadvantage of a ban on travel.

3 An even greater threat to modern existence than disease is climate change caused by global warming. Scientists are agreed that this phenomenon is developing at an alarming rate, as evidenced by the speed at which polar ice caps and glaciers are melting. Carbon dioxide and other pollutants from the travel industry are a major contributor to global warming. The pace of global warming would slow significantly if people travelled less.

4 The centrality of travel to modern existence means that environmentally and socially damaging infrastructure projects are necessary. In the UK, the development of a third runway at Heathrow Airport and the creation of the HS2 high speed rail line would destroy whole villages and rip up large areas of ancient woodland. A massive decrease in the amount of travel would prevent such environmental and social damage. We must not let the vanity projects of overambitious politicians destroy our heritage.

5 Enormous amounts of time are wasted through travelling. A journey of three to four hours is not unusual to enable people to attend meetings, often necessitating an overnight stay. Some may argue that people can work on a train or plane but this is not the case if one is driving up the highway.

3 **(a)** Using the exact words from the passage as far as possible, identify the *main conclusion*. [2]

(b) Using the exact words from the passage as far as possible, identify **two** *intermediate conclusions* in paragraphs 2 to 4. [4]

(c) Identify an *example* in paragraph 2. [2]

(d) Identify **two** *unstated assumptions* required by the reasoning in paragraph 1. [4]

4 **(a)** Identify and evaluate an *appeal* in paragraph 3. [3]

(b) Identify a *personal attack* (*ad hominem*) flaw in paragraph 4 and assess its impact on the strength of the reasoning. [2]

(c) Explain why the reasoning in paragraph 5 is weak. [3]

5 *You are advised to spend some time planning your answer before you begin to write it.*

'It is good for people to have to leave their home to go to their workplace.'

Write your own short argument to support **or** challenge this claim. The conclusion of your argument must be stated. Credit will not be given for repeating ideas from the passage. [8]

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