Cambridge Assessment International Education

Cambridge International AS & A Level

THINKING SKILLS **9694/04**

Paper 4 Applied Reasoning **For examination from 2020**

SPECIMEN PAPER **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. Blank pages are indicated.

1 **(a)** State the main conclusion of Oswin's argument in Document 1. [1]

(b) Analyse the structure of the reasoning in paragraph 1 of Document 1. [4]

(c) Identify **all** the intermediate conclusions in paragraphs 2 to 5 of Oswin's argument in Document 1. [3]

2 **(a)** Identify and explain **three** flaws and/or weaknesses present in Oswin's reasoning in Document 1. [6]

(b) Explain an aspect of Oswin's reasoning which makes his argument weak overall. [3]

3 **(a)** Document 4 explains how the data for two graphs was collected.

Identify and explain two weaknesses in the way the data was collected. [4]

(b) Explain why the claim 'Young people support space exploration more strongly than older people' may not be supported by the statistics presented in graph B in Document 4. [2]

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

'We should explore space.'

Construct a reasoned argument to support **or** challenge this claim, commenting critically on some or all of the Documents and introducing ideas of your own. [27]

DOCUMENT 1

Futile frontier

Supporters of space exploration tell us that the Earth is no longer a mystery and so space exploration becomes the obvious next step for mankind. But there is no reason to look beyond Earth for challenges. There is still much to discover down here. There are deep oceans to explore, new species to discover, diseases to cure, pollution to control, crops to improve etc.

Artificial satellites bring obvious benefits, but no visit to Mars is necessary for these. The costs of the various space exploration programmes are staggering. The Apollo programme, a political stunt to upstage the Soviet Union, had no practical results and cost $20 billion forty years ago; the Saturn V rocket alone cost $9.3 billion. The International Space Station is intended as a base for future missions – missions that might never happen. Its budget has increased dramatically since its design and is already at $60 billion. The Voyager probe, a lump of hardware fired off into deep space, cost a total of $895 million. What benefits has it brought? Maybe some aliens have been entertained by Earth music. All of these projects amount to nothing more than a huge waste of money.

The Hubble Space Telescope, a flying telescope that does nothing but gaze at stars, was sent up faulty! How, with all the advanced technology involved, could something like this happen? Millions of dollars had to be spent to repair it. SETI, the Search for Extra-Terrestrial Intelligence, has a budget of $5 million per year and all it does is listen out for little green men. Thus, hundreds of millions of dollars are being wasted by a few rich countries, while elsewhere millions live in poverty. This money would be much better spent funding organisations that improve life on Earth.

The various space programmes represent a significant cost in human life. Ever since Gagarin stepped into his rocket, men and women have been dying for the sake of space exploration. When the space shuttle Columbia disintegrated over Texas in 2003 the cumulative death toll rose to at least 120. How many more will die, or come close to dying?

Space exploration serves no useful purpose. It should be curtailed. If we don't stop spending money on dreams and start taking care of the planet, pretty soon we won't have anywhere to live.

Oswin

[Turn over

DOCUMENT 2

Why we explore

Human Space Exploration
Humanity's interest in the heavens has been universal and enduring. Humans are driven to explore the unknown, discover new worlds, push the boundaries of our scientific and technical limits, and then push further. The intangible desire to explore and challenge the boundaries of what we know and where we have been has provided benefits to our society for centuries. Human space exploration helps to address fundamental questions about our place in the Universe and the history of our solar system. Through addressing the challenges related to human space exploration we expand technology, create new industries, and help to foster a peaceful connection with other nations. Curiosity and exploration are vital to the human spirit, and accepting the challenge of going deeper into space will invite the citizens of the world today and the generations of tomorrow to join NASA on this exciting journey.

Why the International Space Station?
The first step in embarking on a long and challenging journey involves laying solid groundwork for a successful endeavour. The International Space Station serves as a laboratory for human health, biological and materials research, as a technology test-bed, and as a stepping stone for going further into the solar system. On the International Space Station we will learn new ways to ensure astronauts are safe, healthy and productive while exploring, and we will continue to expand our knowledge about how materials and biological systems behave outside of the influence of gravity. NASA will continue its unprecedented work with the commercial industry, and expand an entire industry as private companies develop and operate safe, reliable and affordable commercial systems to transport crew and cargo to and from the International Space Station and low Earth orbit.

Why Mars?
Mars has always been a source of inspiration for explorers and scientists. Robotic missions have found evidence of water, but whether life exists beyond Earth still remains a mystery. Scientific robotic missions have shown that Mars has characteristics and a history similar to those of Earth, but we know that there are striking differences that we have yet to begin to understand. Humans can build upon this knowledge, look for signs of life and investigate Mars's geological evolution, resulting in research and methods that could be applied here on Earth. A mission to our nearest planetary neighbour provides the best opportunity to demonstrate that humans can live for extended, even permanent, stays beyond low Earth orbit. The technology and space systems required to transport and sustain explorers will drive innovation and encourage creative ways to address challenges. As previous space endeavours have demonstrated, the resulting ingenuity and technologies will have long lasting benefits and applications. The challenge of travelling to Mars and learning how to live there will encourage nations around the world to work together to achieve such an ambitious undertaking. The International Space Station has shown that opportunities for collaboration will highlight our common interests and provide a global sense of community.

NASA

DOCUMENT 3

India launches Mars mission

Scientists from the Indian Space Research Organisation (ISRO) successfully launched their Mars Orbiter Mission on Tuesday, amid celebrations at mission control. As the launch vehicle soared spaceward scientists from ISRO could be heard shouting 'Buriah!' – brilliant.

Indian scientists hailed the launch as a success and said they hoped it would herald a new era of low-cost space exploration. 'I have no doubt the mission has been worthwhile and the credit for it goes to the scientists at the space department,' said Dr PM Bhargava.

The 'Mangalyaan' or Mars Orbiter was launched on an Indian Polar Satellite Launch Vehicle from the Satish Dhawan Space Centre, at Sriharikota, on the Andhra Pradesh coast, at 14:38 Indian time. The mission is a bid to reach the Red Planet in September 2014 and test the Martian atmosphere for hydrogen and methane gases. The mission will cost $73 million, compared with the United States' 'Curiosity' mission to Mars, which launched in 2011 at a cost of $2.5 billion.

For India, the mission is about proving the value of its indigenous rocket and instrument technology, to inspire its own scientists and open a new frontier on infinitely cheaper space missions. Its officials believe a successful mission will establish its superiority over regional rivals China and Japan, whose recent Mars missions failed to achieve their goals.

Though the mission is cheap by developed countries' standards, it has faced criticism in India, where commentators have questioned why the money has not been spent instead on improving poor sanitation. Tavleen Singh, a columnist for the *Indian Express*, said on Twitter: 'Incredible India: we can go to Mars but cannot provide clean water to our people on Earth.' Some Indian space scientists have criticised the mission as a waste of resources for a developing country and argued that ISRO should focus on developing its next generation of satellite launchers to compete in the lucrative commercial sector. But officials at the Mangalyaan launch site said the mission will inspire a new generation of Indian space scientists and establish the country as a real power in space research.

'The primary goal is the technical demonstration. This will help us in future space exploration missions by advancing our existing technology in communications and Earth observation satellites. We hope it will also inspire younger minds', ISRO spokesman Deviprasad Karnik told *The Telegraph*.

Opinion article in daily newspaper, 2013

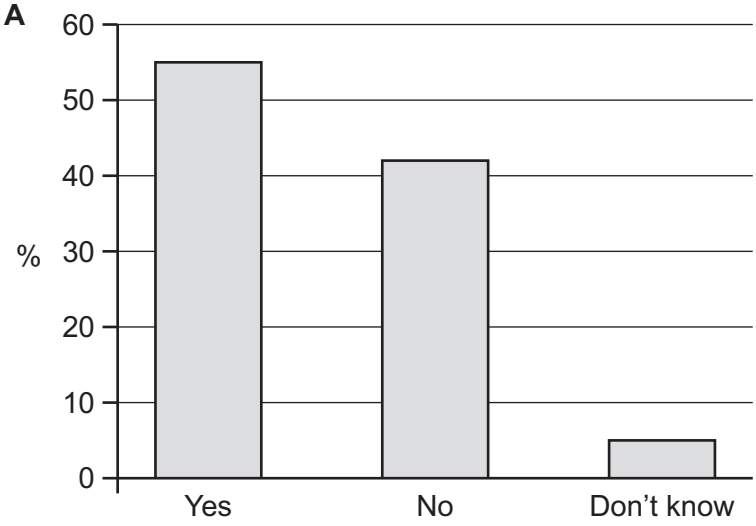
DOCUMENT 4

Some statistics about public opinion

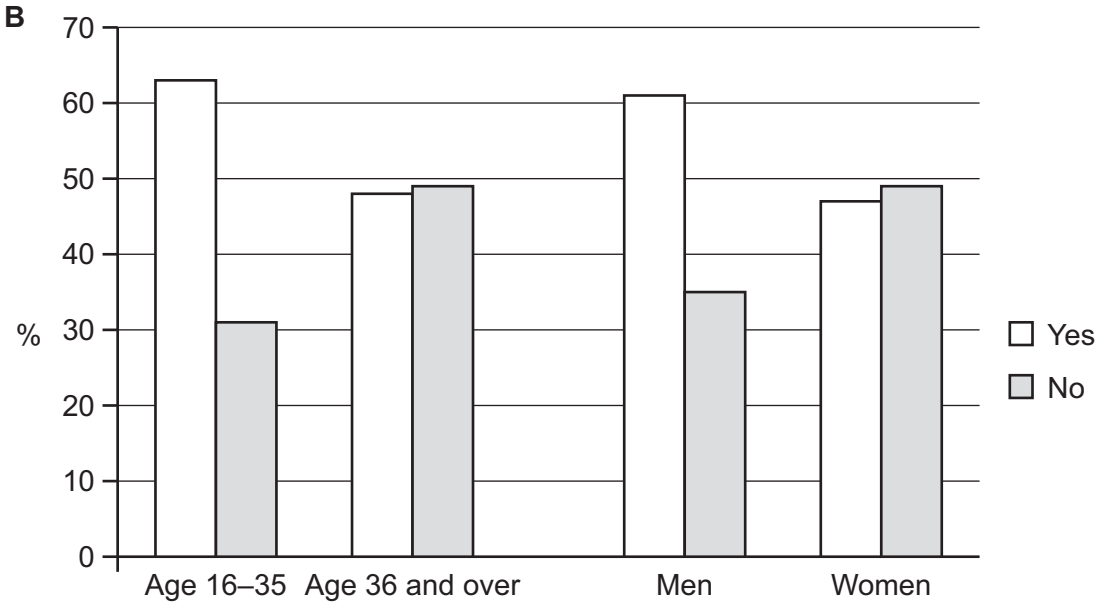
A large number of people from 12 countries on three different continents were asked their opinions about space exploration. The reputable polling company selected people at random and then contacted them by email or telephone. Some of the results are shown below.

Responses to the question 'Do you agree that humans should explore space?'

A



B



Responses to other questions showed that people are less enthusiastic about NASA's planned manned mission to Mars. 64% say it is not important for a human being to set foot on Mars, while 32% say it is. 28% say that the US space agency will be the first to send a human being to Mars, 19% think it will be China and 8% believe it will be Russia.

DOCUMENT 5

National space agency budgets

The annual budgets listed are the official budgets for national space agencies available in the public domain. For European contributors to the European Space Agency (ESA), the national budgets shown are separate from their contributions to the ESA.

Budgets of different national or regional space agencies

Country/region	$US million
USA	17 700
Russia	5 600
Europe	5 380
France	2 822
Japan	2 460
Germany	2 000
India	1 320
China	1 300
Italy	1 000
Iran	500
Canada	489
UK	414
Brazil	343
South Korea	300
Ukraine	250
Argentina	180
Belgium	170
Spain	135
Netherlands	110
Sweden	100
Pakistan	85
Switzerland	10
Mexico	8

Wikipedia

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