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General Certificate of Education
Advanced Subsidiary Level

GLOBAL PERSPECTIVES

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Paper 1 Written paper

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1 hour 30 minutes

RESOURCE BOOKLET

READ THESE INSTRUCTIONS FIRST

This Resource Booklet contains Documents 1 and 2 which you should use to answer the questions.

You should spend approximately 10 minutes reading the documents before attempting to answer the questions. This is allowed for within the time set for the examination.



This document consists of **3** printed pages and **1** blank page.



The documents below consider Gene Modification and Medical Ethics. Read them **both** in order to answer **all** the questions on the question paper.

Document 1: adapted from *An Introduction to Synthetic Biology* by ETC. This is taken from the introduction to a series of conference papers entitled *Extreme Genetic Engineering*, produced in 2007. ETC Group is an international civil society organisation based in Canada and dedicated to the conservation and sustainable advancement of cultural and ecological diversity and human rights.

Genetic engineering is *passé*. Today scientists aren't just mapping and manipulating genes, they're building life from scratch – and they're doing it in the absence of societal debate and regulatory oversight. A new generation of extreme biotech enthusiasts have moved to the next frontier in the manipulation of life: building it from scratch. They call it *synthetic biology* – the design and construction of new biological parts, devices and systems that do not exist in the natural world and also the redesign of existing biological systems to perform specific tasks. The social, environmental and bio-weapons threats of synthetic biology surpass the possible dangers and abuses of biotech. Using a laptop computer, published gene sequence information and mail-order synthetic DNA, just about anyone has the potential to construct genes from scratch. It will become no big deal to cobble together a designer gene, insert it into an empty bacterial cell and – *voilà* – give birth to a living, self-replicating organism. Other synthetic biologists hope to reconfigure the genetic pathways of existing organisms to perform new functions – such as manufacturing high-value drugs or chemicals.

They aim to commercialise new biological parts, devices and systems that don't exist in the natural world – some of which are designed for environmental release. Advocates insist that synthetic biology is the key to cheap biofuels, a cure for malaria and climate change – media-friendly goals that aim to ease concerns about a dangerous and controversial technology. Ultimately synthetic biology means cheaper and widely accessible tools to build bio-weapons, virulent pathogens and artificial organisms that could pose grave threats to the planet. The danger is not just bio-terror, but “bio-error.”

Like biotech, the power to make synthetic life could be concentrated in the hands of major multinational firms. As gene synthesis becomes cheaper and faster, it will become easier to synthesise a microbe than to find it in nature or retrieve it from a gene bank. Biological samples will move instantaneously across the globe and be resurrected in labs thousands of miles away – a practice that could erode future support for genetic conservation and create new challenges for international negotiations on biodiversity.

As attention switches from *reading* to *writing* genetic information, synthetic biologists can now snub their noses at nature's designs in favour of made-to-order life forms. Using engineering concepts borrowed from electronics and computing, synthetic biologists are building simplified versions of bacteria, re-programming DNA as a computing medium and assembling new genetic systems that are human directed.

Meanwhile the “artificial life industry” is growing up in a “Wild West” free-for-all environment. Civil society and social movements recognise that “extreme biotech” is a dangerous technology that must not be developed in the absence of widespread societal debate and legally binding regulation. The quest to build new, living organisms in the laboratory crosses unacceptable ethical boundaries. In May 2006, 38 civil society organizations from around the world joined together in an open letter, expressing concern that “this potentially powerful technology is being developed without proper societal debate concerning socio-economic, security, health, environmental and human rights implications.”

Document 2: adapted from an article in *The Journal of Medical Ethics*. This is an international peer reviewed journal for health professionals and researchers in medical ethics. The article was originally written in 2003.

By using tissue typing genetic diagnosis doctors are able to pick a human embryo for implantation which, if all goes well, will become a “saviour sibling”, capable of donating life-saving tissue to an existing child.

Banning Preimplantation Genetic Diagnosis (PGD) to create saviour siblings will lead to the death of children who could have been saved. Given that a ban will be fatal for a section of the population prohibitionists must demonstrate that these children’s deaths are less terrible than the consequences of allowing this use of PGD.

The idea of deliberately creating a saviour sibling often provokes comments like these:

“It is totally unethical. You are not creating a child for itself. We have very serious concerns that he is a commodity rather than a person.”

Such comments run together two worries: concerns about people having children for the wrong reasons and concerns about the way in which the child will be treated. Clearly, conceiving can be wrong if done for the wrong reasons. If you were to take this as a guiding principle then conceiving a child in order to eat it or torture it would be uncontentious, if extreme supporting examples. The real question is: Which reasons are the wrong reasons? One answer is that a child should be wanted for its own sake.

The commonest objection to this procedure is that it is wrong to bring children into existence “conditionally”. This finds its foundation in the philosopher Kant’s dictum, “Never use people as a means but always treat them as an end”.

As an argument against selecting saviour siblings; this is defective. It relies on misreading Kant’s dictum. This does not prohibit treating people as means, but prohibits treating them merely or solely as means. We treat people as a means perfectly innocuously much of the time. In medical contexts, anyone who receives a blood transfusion has used the donor as a means to their own ends. So there is nothing objectionable about creating a baby as a “means to an end” provided it is also treated as a human being.

A more practical objection is that it does not adequately distinguish between creating a child as a saviour sibling and for some other “instrumental” purpose – for example, completing a family, being a playmate, saving a marriage, delighting prospective grandparents, or providing an heir. Perhaps these things are different from a saviour sibling but, if they are, the difference isn’t that they are any less “instrumental” for in all these cases, the child is used as a means.

The concern then cannot really be about having a child as a means since people frequently do this. What might be objectionable is creating a child solely to advance some further end. For example, it would obviously be wrong to create a saviour sibling and then just to discard it once it had “served the purpose”. But this is clearly not what is proposed and so, overall, this argument fails, as a purely ethical argument and as a case for legal prohibition.

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Copyright Acknowledgements:

Document 1 © adapted: *Extreme Genetic Engineering: An Introduction to Synthetic Biology*; www.etcgroup.org; 2007.

Document 2 © adapted: *Journal of Medical Ethics*; www.jme.bmj.com.

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