



General Certificate of Education  
Advanced Subsidiary Examination  
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## **General Studies (Specification A)**

## **GENA2**

**Unit 2 AS Science and Society**

## **Source Booklet**

Source for use with **Questions 1.1 to 1.30.**

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## Section A

### Source for Questions 1.1 to 1.30

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#### IVM - a cheap, painless alternative to IVF?

- (1) A landmark in the development of fertility treatment was announced by doctors with the birth of the first babies to be conceived in the UK using a revolutionary technique that offers a safe, cheaper alternative to In Vitro Fertilisation (IVF). The parents of the babies were clearly delighted. The twin boy (birthweight 3.04 kg) and girl (2.68 kg), who were born in October 2007, were conceived using In Vitro Maturation (IVM). Specialists said the development could make in vitro techniques available to more infertile couples by cutting the cost of treatment. Infertility is estimated to affect one in six couples in the UK but conventional IVF costs around £5000 a cycle and treatment is restricted on the NHS.
- (2) Tim Child, a consultant gynaecologist at Oxford who led the work, said “I think it is a safer, cheaper alternative to IVF for all women. However, for many women the success rates are currently much lower. Research in the future will address this.” The Oxford Fertility Clinic is the only one in the UK licensed to use the technique. Twenty cycles of treatment have been carried out and four other women are currently pregnant, giving a pregnancy rate of 25%. This is expected to improve with further experience. In addition, without the need for drugs, repeating the procedure would be less taxing on a woman.
- (3) In standard IVF the woman takes powerful fertility drugs for five weeks to stimulate the production of extra eggs, which are then collected direct from her ovaries under the guidance of ultra-sound, before being fertilised in the laboratory. The drugs cost between £600 and £1500 with charges often higher in London. The procedure is time-consuming and uncomfortable and for the third of women undergoing fertility treatment with polycystic ovaries (see **Figure 1**) there is a 1 in 10 risk of severe ovarian hyperstimulation syndrome, a dangerous side-effect that in rare cases can prove fatal.

#### **Figure 1: Polycystic ovaries**

Polycystic ovarian syndrome (PCOS), is a condition associated with multiple cysts in the ovaries. During each normal menstrual cycle, the ovaries release an egg (ovum) into the uterus. Before the egg is ready to be released, it develops inside a tiny swelling (called a follicle or cyst) on the ovary. Each month, several follicles start to develop but, in most cases, only one goes on to mature fully and release an egg.

The ovaries are also responsible for making oestrogen, the main female hormone, and small quantities of male hormones, such as testosterone.

In polycystic ovarian syndrome, many follicles are produced but often none develop enough to release an egg, meaning that ovulation does not take place. The production of hormones is also often unbalanced, with lower levels of oestrogen and slightly raised levels of testosterone.

Approximately one in ten British women have PCOS to some degree and, of those referred for an ultra-sound examination, about 25% are found to have polycystic ovaries.

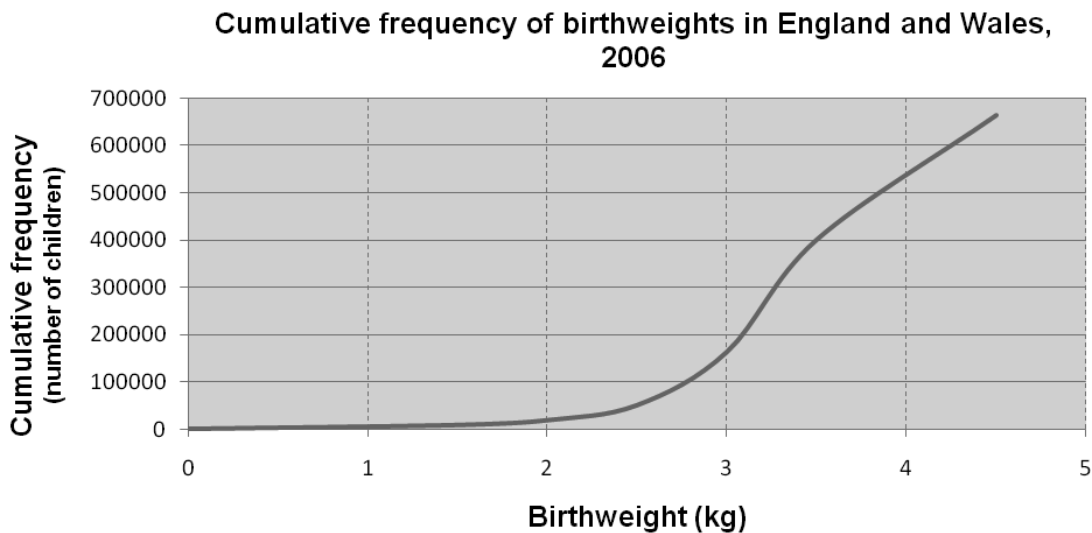
- (4) However, multiple births are still likely, and these are the single biggest risk from IVF treatment. Multiple birth babies are more likely to be premature and below average birth weight and the risk of death before birth or within the first week is more than 4 times greater for twins and almost 7 times greater for triplets than for single births.

**Figure 2: IVF multiple births in England and Wales 2005**

	Single births	Single babies	Twin births	Twin babies	Triplet births	Triplet babies
IVF live births	6 888	6 888	2 136	4 272	34	102

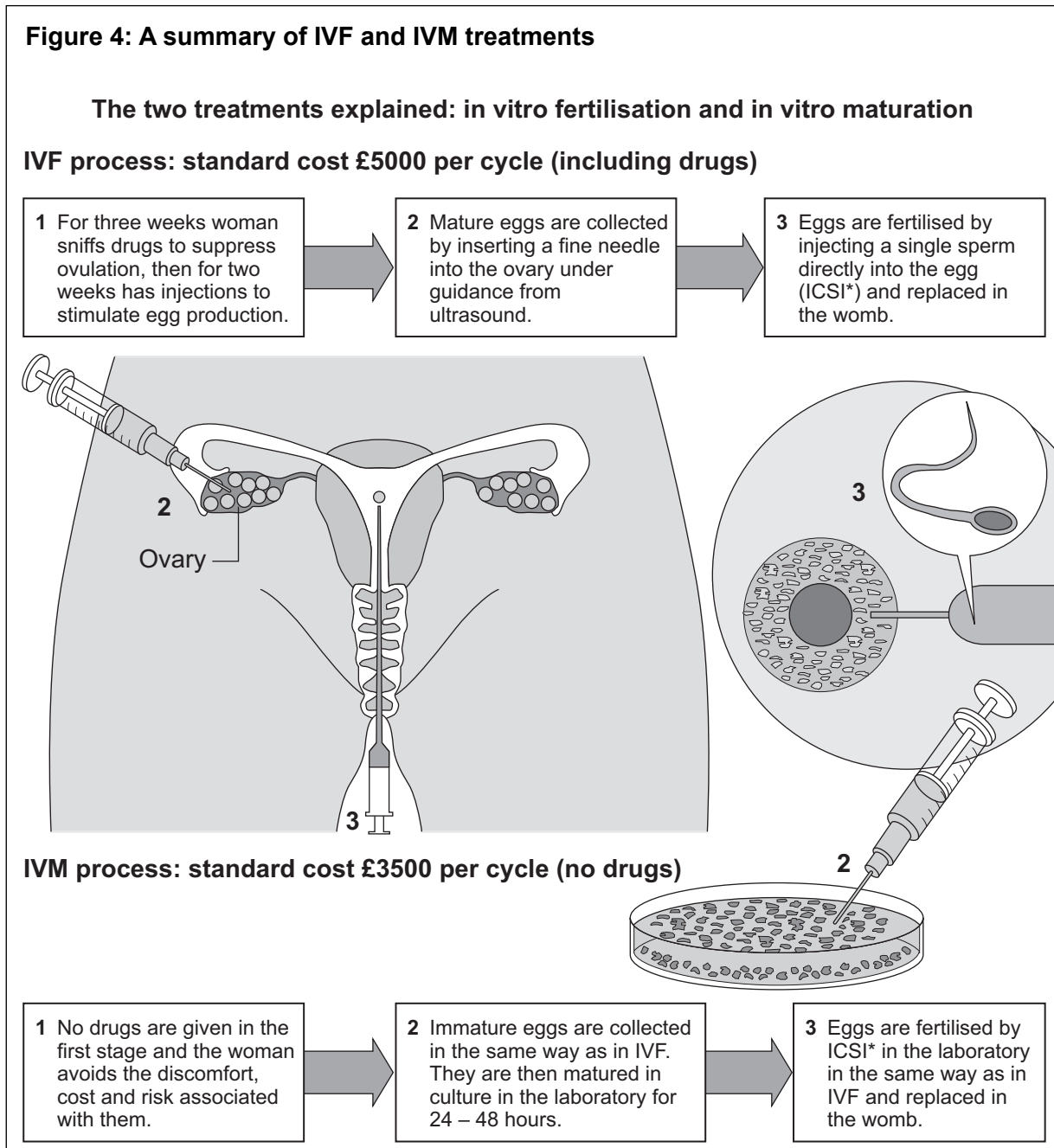
**Figure 3: Frequency and cumulative frequency of birthweights for children born in England and Wales, 2006**

Birthweight (kg)	under 1.5	1.5 – 1.999	2.0 – 2.499	2.5 – 2.999	3.0 – 3.499	3.5 and over	Total
Frequency (Number of children)	8 247	10 229	31 645	112 688	237 319	263 263	663 391



- (5) IVM avoids the use of drugs and instead involves collecting eggs from the ovaries while they are still immature. The eggs are then grown in the laboratory for 24 to 48 hours before being fertilised and replaced in the womb. The main advantage is improved safety for women and the risk of severe ovarian hyperstimulation syndrome is completely removed.

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\* see **Figure 5** on page 5

- (6) The IVM technique was pioneered in Canada, but has also been used in South Korea and Scandinavia as well as the UK. To date about 400 babies have been born worldwide using IVM compared with around two million by IVF over the last 25 years.
- (7) Avoiding the use of powerful drugs would have a second important benefit – reducing the cost of treatment to approximately £3500 per cycle. Cost is a major barrier for thousands of infertile couples denied treatment on the NHS – they cannot afford to go private and lose the chance to have a family. The major shortcoming in IVM is its low success rate. A 25% pregnancy rate will not be enough to attract most couples, although on a total of just 20 cycles carried out in the UK it is a near meaningless figure. Compared with IVF rates of 45% and more it is a powerful disincentive, even if the risks are lower. But these are early days. When IVF first became widely available in the 1980s live birth rates were around 14%.

- (8) At present the Oxford Clinic is only offering IVM treatment to women with polycystic ovaries but in the long term it is hoped to offer the procedure to all women. Mr Child said “We are not offering it to women with normal ovaries as we don’t get enough eggs from them. It depends on the number of resting follicles and with normal ovaries you don’t get so many eggs. On average we get four eggs from a woman with normal ovaries compared with 16 from one with polycystic ovaries. The procedure involves a process of attrition – two-thirds mature and two-thirds of those fertilise – so you need a decent number to start with.”
- (9) A second drawback of the procedure is that eggs grown in the culture had a harder outer layer than those matured in the ovary and were more difficult for sperm to penetrate. The eggs had to be fertilised by ICSI – injecting a single sperm into the egg. “We hope to develop the culture medium so the egg doesn’t mind being grown in the laboratory and we can use ordinary insemination, mixing eggs and sperm so fertilisation occurs naturally. In most IVF clinics approximately 50% of patients are treated with ICSI anyway.”

### Figure 5: Intra-Cytoplasmic Sperm Injection (ICSI)

ICSI is the injection of a single sperm directly into the egg using a specially prepared needle. With ICSI very few sperm are required and the ability of the sperm to penetrate the egg is no longer important as this penetration is bypassed by the ICSI technique. It is important to remember that whilst ICSI is a technique used in the laboratory to help fertilisation occur, it does not guarantee it.

Couples go through the same preparatory processes as with IVF, namely ovulation induction and egg collection.

A small percentage of eggs (fewer than 1 in 10) will be damaged by the injection process and the damage is evident at the time of the injection procedure. These eggs can no longer be used. Of the remaining eggs, however, on average 6 out of 10 are fertilised following the ICSI procedure. The fertilised eggs are allowed to develop as for standard IVF treatment prior to embryo transfer.

- (10) A spokesman for the Human Fertilisation and Embryology Authority (HFEA) said it was too soon to tell whether IVM would replace IVF. “Anything that reduces the cost of IVF, provided it is safe, means that treatment could be available to more people. But this is an emerging technology. The most important thing is that patients get proper information so that they can make a decision on what is best for themselves.”
- (11) The HFEA has been scrutinising the research into IVM since early 2006. Its advisory group has concluded there was no evidence to suggest it is dangerous and no evidence that it increases the risk of birth abnormalities – a concern because of the use of immature eggs. But it warned that the oldest children conceived by the technique were little more than toddlers and long-term evidence was lacking.

Source: adapted from ‘A cheap, painless alternative to IVF?’ JEREMY LAURANCE, *The Independent*, 25 October 2007

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