Unit 7: Human reproduction

Recommended prior knowledge
Students should have knowledge of the basic principles of sexual reproduction, which has been covered in Unit 6. They should also understand the nature of hormones, dealt with in Unit 5.

Context
This unit builds on the work on sexual reproduction covered in Unit 6, both units lead into study of genetics, to be covered in Unit 8.

Outline
This unit considers the biological aspects of human reproduction, and also provides the opportunity to discuss some of the social and ethical issues associated with birth control, artificial insemination and fertility drugs. It is a relatively short unit, with no real opportunities for practical work however it does lend itself to the interpretation of data and to discussion within the group on such topics as human development during adolescence, contraception and human population growth. This unit can easily be combined with either Unit 6 Reproduction in plants or Unit 8 Inheritance and evolution.

(Please note: **(S)** in **bold** denotes material in the Supplement (Extended syllabus) only)

Syllabus ref	Learning objectives	Suggested teaching activities	Learning resources
III 1.2.2	7.1 Sexual reproduction in humans • Identify on diagrams the male reproductive system: – the testes – scrotum – sperm ducts – prostate gland – urethra – penis • State the functions of these parts • Identify on diagrams of the female reproductive system: – the ovaries – oviducts – uterus	Diagrams and models can be used to illustrate the structure of the male and female reproductive systems. Students should be able to interpret either front or side views. Students need to be able to spell **uterus** and **urethra** correctly. Link with hormones from Unit 5.2. It should be emphasised that ovulation occurs monthly and that the cycle is repeated throughout a woman's fertile life. Mention that fertilisation usually takes place in an oviduct, rather than the uterus.	*Biology for IGCSE*, Williams et al. Nelson Thornes, 2009 p182–193 Video clips – Fertilisation: www.bbc.co.uk/learningzone/clips/an-introduction-to-fertilisation/116.html www.bbc.co.uk/learningzone/clips/human-fertilisation/1849.html

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III 1.2.2	– cervix – vagina • State the functions of these parts • Describe the menstrual cycle in terms of changes in the uterus and ovaries • Outline sexual intercourse and describe fertilisation in terms of the joining of the nuclei of male gamete (sperm) and the female gamete (egg) • Outline early development of the zygote simply in terms of the formation of a ball of cells that becomes implanted in the wall of the uterus • Outline the development of the fetus: – describe the function of the placenta and the umbilical cord in relation to – exchange of dissolved nutrients – gases – excretory products (no structural details of the placenta are required) • Describe the ante-natal care of pregnant women including special dietary needs and maintaining good health • Outline the processes involved in labour and birth	Diagrams should be drawn to show the relationship between the fetus, umbilical cord and placenta. The large surface area of the placenta can be compared to that of the villi or the alveoli that allows for the maximum diffusion across the membrane. Understand that maternal blood and foetal blood do not mix. The mother may have a different blood group and her blood is at a much higher pressure. Students should understand that glucose and amino acids cross the placenta, not 'large' nutrients. Oxygen, glucose and amino acids diffuse into the blood of the fetus. It is important to emphasise the importance of the mother's diet during pregnancy and to emphasise the possible problems incurred by the fetus if the mother smokes, drinks, takes recreational drugs. Link with Unit 5.5 Drugs. Mention that hormones are involved in the process of birth. Discussion on the topic of birth may need to be controlled and it can be important for the teacher to have some knowledge of the group's family situation as many students will talk about cot deaths, stillborn babies, caesarean section births, miscarriages etc. Student progress could be assessed using: May/June 2011 Paper 0610/21 question 3 May/June 2011 Paper 0610/22 question 4 May/June 2010 Paper 0610/21 question 6 May/June 2009 Paper 0610/02 question 8 Oct/Nov 2009 Paper 0610/02 question 6	Revision and animations – Human reproduction: www.bbc.co.uk/schools/gcsebitesize/science/aqa/evolution/reproductionrev1.shtml
III 1.2.2 (S)	**7.1** • **Compare male and female gametes:** – **in terms of size** – **numbers**	Explain the importance of male and female gametes in sexual reproduction. Gametes could be compared as a table.	

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	– **mobility** • **Explain the role of hormones in controlling the menstrual cycle:** – **FSH** – **LH** – **progesterone** – **oestrogen** • **Indicate the functions of the amniotic sac and the amniotic fluid** • **Describe the advantages and disadvantages of breast-feeding compared with bottle-feeding using formula milk**	Students should draw a chart / graph and write in the hormones (in different colours) at the relevant times within the cycle. The role of hormones and the effect on the uterus and menstruation are difficult to understand. Protection of the fetus, the amniotic sac prevents entry of bacteria and the amniotic fluid supports the fetus from physical damage and absorbs the excretory materials of the fetus. This topic can be dealt with through discussion, perhaps after students have done a little research of their own. The biological advantages of breast-feeding are incontrovertible, but students should also be aware of social and health reasons why there are benefits to breast feeding. Student progress could be assessed using: May/June 2011 Paper 0610/32 question 3 May/June 2011 Paper 0610/31 question 3 May/June 2010 Paper 0610/31 question 3 Oct/Nov 2010 Paper 0610/31 question 2 Oct/Nov 2010 Paper 0610/33 question 6	www.cyberparent.com/breastfeed/ some mothers find this difficult and prefer to use formula milk. www.nct.org.uk/parenting/feeding contains information on bottle and breast feeding. Breastfeeding advice: www.nhs.uk/Planners/breastfeeding/Pages/breastfeeding.aspx
III 1.3	7.2 Sex hormones • Describe the roles of testosterone and oestrogen in the development and regulation of secondary sexual characteristics at puberty	The general characteristics of hormones will already have been covered, and here the sex hormones are introduced. Puberty is when the sex organs become mature and start to produce hormones as well as gametes. Students can make a table to compare the secondary sexual characteristics as shown by male and female. This can be a difficult topic to understand and past questions are a means of reinforcing the ideas. Candidates should be aware of the cyclical secretion of oestrogen and progesterone from the ovary. Progesterone is also secreted by the placenta during pregnancy. Student progress could be assessed using: Oct/Nov 2010 Paper 0610/22 question 5 May/June 2008 Paper 0610/02 question 6	*Biology for IGCSE*, Williams et al. Nelson Thornes, 2009 p194–195

Syllabus ref	Learning objectives	Suggested teaching activities	Learning resources
III 1.3 (S)	**7.2** • **Describe the sites of production and the roles of oestrogen and progesterone in the menstrual cycle and in pregnancy (cross reference to supplement III. 1.2.2)**	Link with Unit 7.1 supplement.	Hormones in the menstrual cycle: www.bbc.co.uk/schools/gcsebitesize/science/aqa/human/hormonesrev3.shtml
III 1.4	7.3 Methods of birth control • Outline the following methods of birth control: – natural (abstinence, rhythm control) – chemical (contraceptive pill, spermicide) – mechanical (condom, diaphragm, femidom, IUD) – surgical (vasectomy, female sterilisation)	A simple description of the biological basis of the different types of birth control is required. Students should also understand the relative effectiveness of each, and may want to discuss the ways in which religious or cultural beliefs can affect their use. Students should be shown examples of each type of contraceptive if at all possible. The advantages of condoms in reducing the risk of transmitting diseases such as HIV /AIDS should also be considered. Student progress could be assessed using: May/June 2011 Paper 0610/22 question 4b Oct/Nov 2008 Paper 0610/32 question 4a	*Biology for IGCSE*, Williams et al. Nelson Thornes, 2009 p196–197 www.avert.org/teens-condoms.htm
III 1.4 (S)	**7.3** • **Outline artificial insemination and the use of hormones in fertility drugs and discuss their social implications**	A simple factual treatment of what artificial insemination is, and the use of fertility drugs, will be required before students can discuss the social and ethical issues associated with it. Extension – these issues regularly find their way into the news, and it is useful to collect a range of articles from newspapers and magazines that could form the basis for discussion.	Controlling fertility: www.bbc.co.uk/schools/gcsebitesize/science/aqa/human/hormonesrev4.shtml
III 1.5	7.4 Sexually transmissible diseases • Describe the symptoms, signs, effects and treatment of gonorrhoea • Describe the methods of transmission of human immunodeficiency virus (HIV) and	Gonorrhoea is used as an example of a relatively common sexually-transmitted disease caused by a bacterium, readily treated with antibiotics. Link with Unit 10.5 Drugs. HIV, on the other hand, is caused by a virus, and as yet no cure is available. Although no detail is expected of the symptoms of AIDS, it could be useful to deal with these briefly,	*Biology for IGCSE*, Williams et al. Nelson Thornes, 2009 p198–199 HIV/AIDS: www.abpischools.org.uk/page/mod

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	the ways in which HIV/AIDS can be prevented from spreading	with reference back to the functions of white blood cells in Unit 4.8 Blood and to the importance of using a mechanical barrier such as a condom during sexual intercourse if the person does not have a single partner. Link with Unit 5.5 Drugs, the action of antibiotics on bacteria but not on viruses. Extension – students could research current advances in HIV treatments and drugs. Student progress could be assessed using: Oct/Nov 2008 Paper 0610/02 question 5 Oct/Nov 2008 Paper 0610/32 question 4d	ules/diseases/diseases3.cfm
III 1.5 (S)	**7.4** • **Outline how HIV affects the immune system in a person HIV/AIDS**	Student progress could be assessed using: Oct/Nov 2010 Paper 0610/32 question 4 Oct/Nov 2008 Paper 0610/32 question 4c	HIV/AIDS: www.abpischools.org.uk/page/modules/diseases/diseases3.cfm