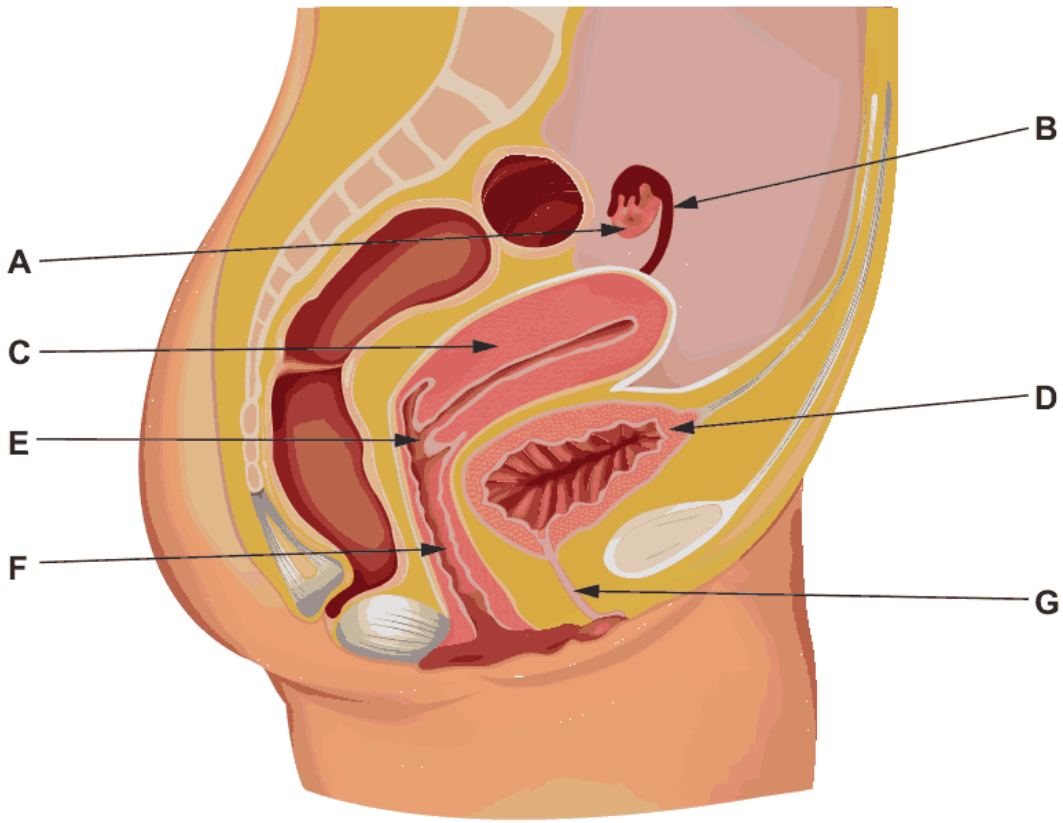
Sexual Reproduction in Humans (2.3): Eduqas A Level Biology Exam Questions by Topic

23 questions · 52 marks · about 62 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Component 2 · June 2022 · Q3(a)(i) · 3 marks

3. Advances in human fertility treatment involve an understanding of reproductive anatomy and physiology. **Image 3.1** shows a vertical section through a human female reproductive system.

Image 3.1



(a) (i) Using some of the letters **A – G** from **Image 3.1** complete the table below to identify the site of the following: [3]

	Letter

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

FSH and LH control the development and release of a secondary oocyte	
meiosis I takes place before birth to produce about 100 000 primary oocytes	
secretions are neutralised by alkaline seminal fluid during intercourse	
oxytocin has a positive feedback effect during birth	

(ii) Explain how the function of the structure labelled **G** is different in male and female mammals. [1]

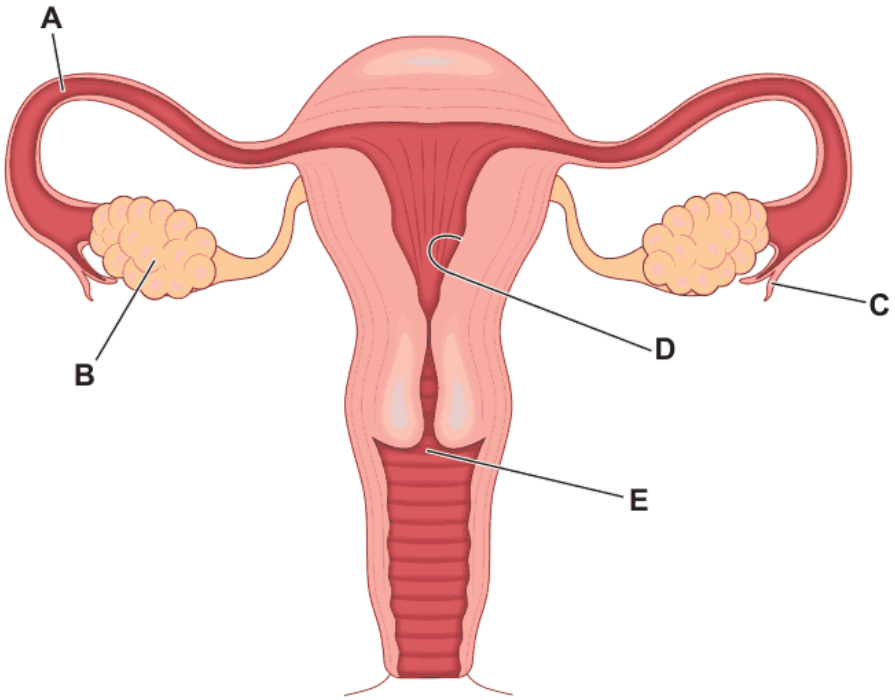
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1. **Image 1.1** shows a front view of the female reproductive system.

Image 1.1



(a) Using some of the letters **A–E** from **Image 1.1** complete **Table 1.2** to identify the site of the following processes. Letters may be used once, more than once or not at all. [3]

Table 1.2

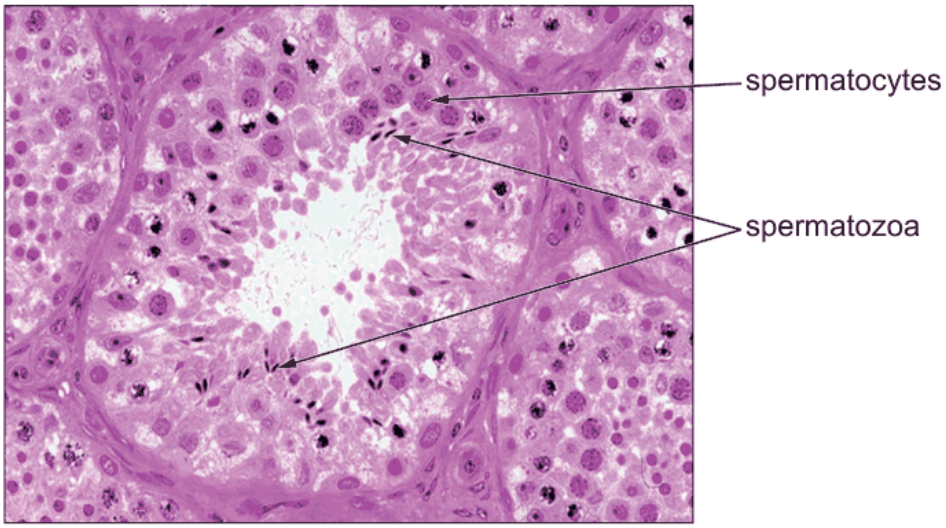
	Letter
Sperm is normally deposited during sexual intercourse	
Fertilisation of the ovum normally occurs	
The blastocyst normally implants	
The placenta normally forms	

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Question 4 · A level Component 2 · June 2023 · Q4(a)(i) · 2 marks

4. The process of spermatogenesis takes place in the seminiferous tubules, as shown in **Image 4.1.**

Image 4.1



(a) (i) The heads of the spermatozoa are clustered around specific cells. Name the cells that the spermatozoa are clustered around and state their function. [2]

Question 5 · A level Component 2 · June 2023 · Q4(a)(ii) · 3 marks

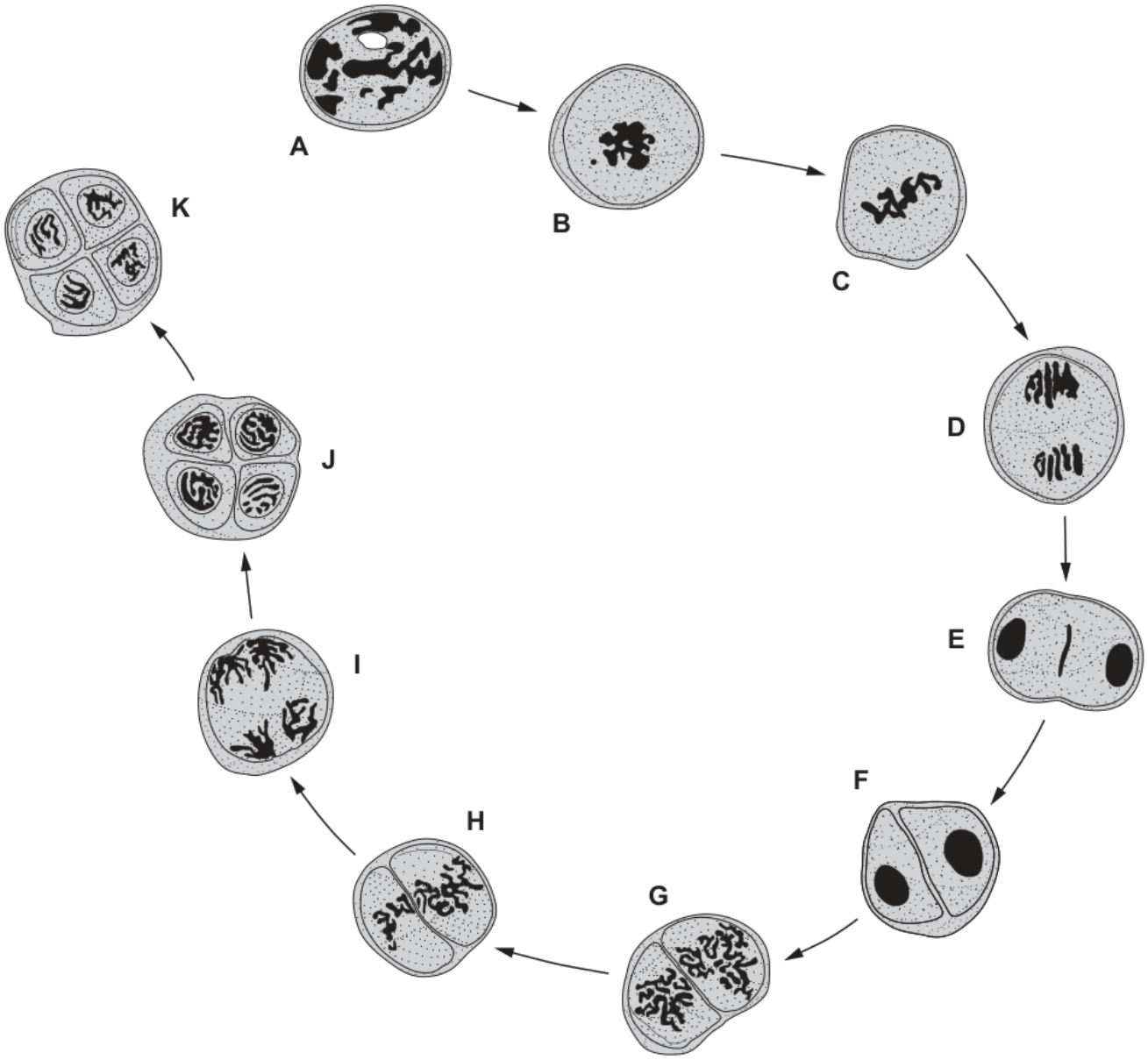
(ii) Explain why both mitosis and meiosis are involved in the production of spermatozoa. [3]

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Question 6 · information from earlier in the question

3. Pollen grain formation in flowering plants involves both mitosis and meiosis. **Image 3.1** shows stages in the formation of pollen grains in a species of lily *(Lilium sp.)* by meiosis.

Image 3.1



Question 6 · A level Component 2 · Autumn 2021 · Q3(b)(ii) · 3 marks

(ii) Name the cells produced in spermatogenesis in a mammal that are at the same stage of meiosis as the following stages in the formation of pollen grains in **image 3.1**. [3]

A .....

F .....

K .....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 7 · A level Component 2 · June 2022 · Q6(b)(iii) · 2 marks

(iii) Structure **Y** is a primary follicle. Describe the stages in oogenesis that occur during the maturation of a primary follicle into a Graafian follicle. [2]

.....

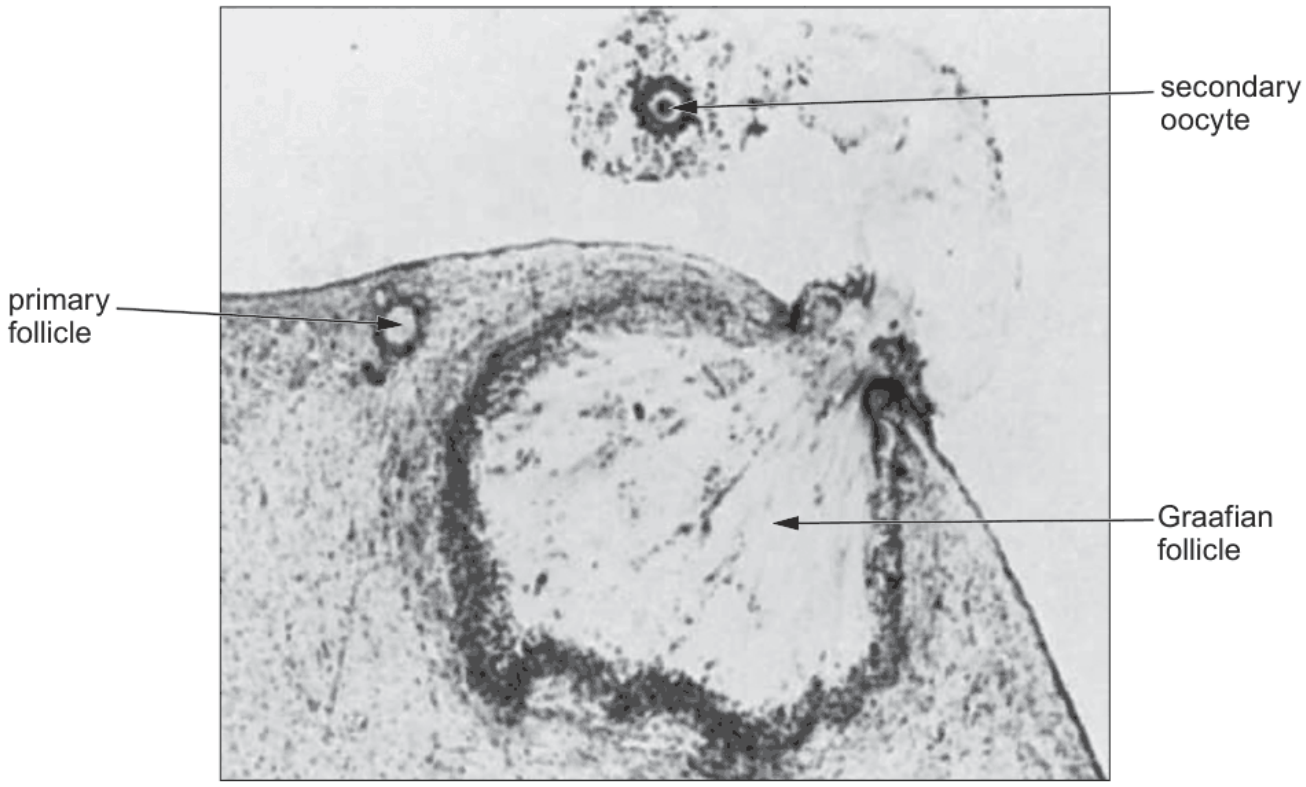
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Question 8 · A level Component 2 · June 2017 · Q6(a) · 2 marks

6. The photomicrograph below shows part of an ovary during ovulation.



(a) Describe what subsequently happens to the following: [2]

secondary oocyte;

.....

Graafian follicle.

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 9 · A level Component 2 · June 2017 · Q6(b)(i) · 4 marks

(b) (i) Describe how the hormones FSH and oestrogen illustrate the principle of negative feedback in controlling ovulation. [4]

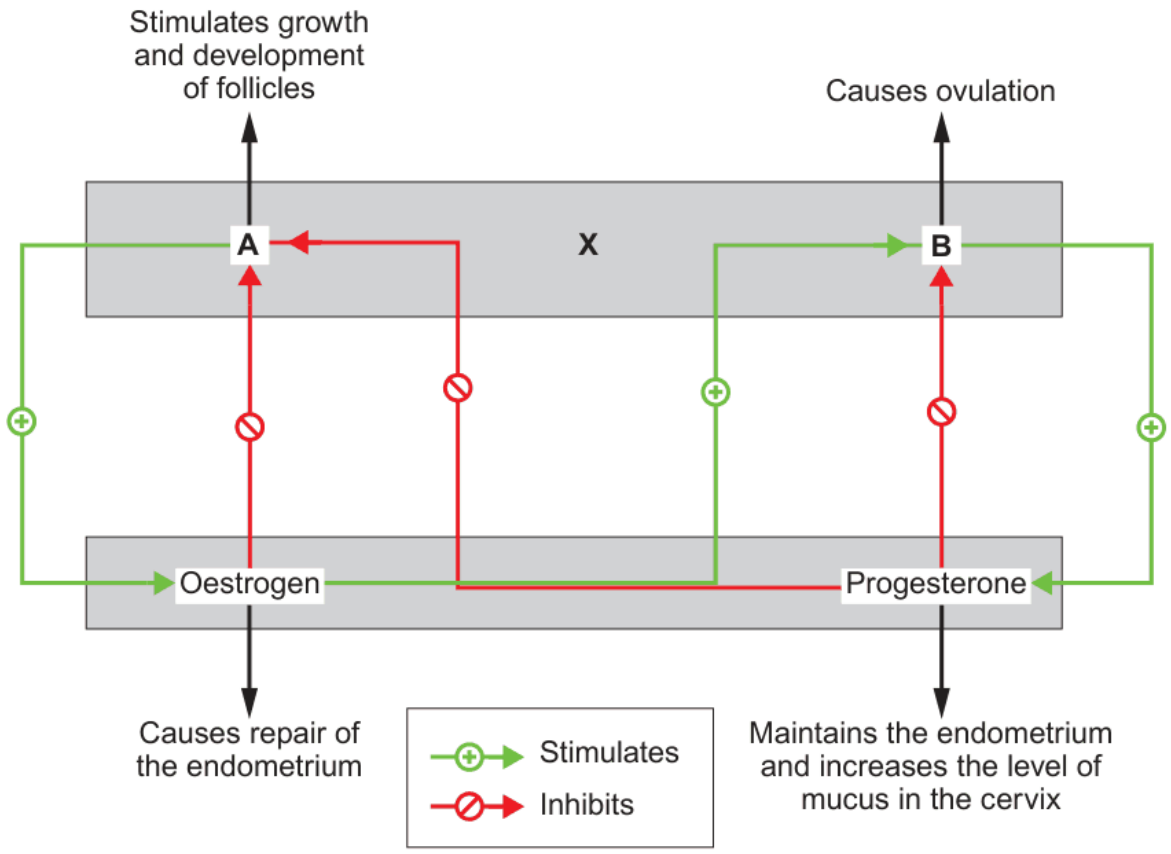
Question 10 · A level Component 2 · June 2017 · Q6(b)(ii) · 3 marks

(ii) Explain why oestrogen may therefore be used as a contraceptive. [3]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

5. The menstrual cycle is controlled by the interaction of a number of different hormones as shown in the flow chart in **image 5.1**.

Image 5.1



Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

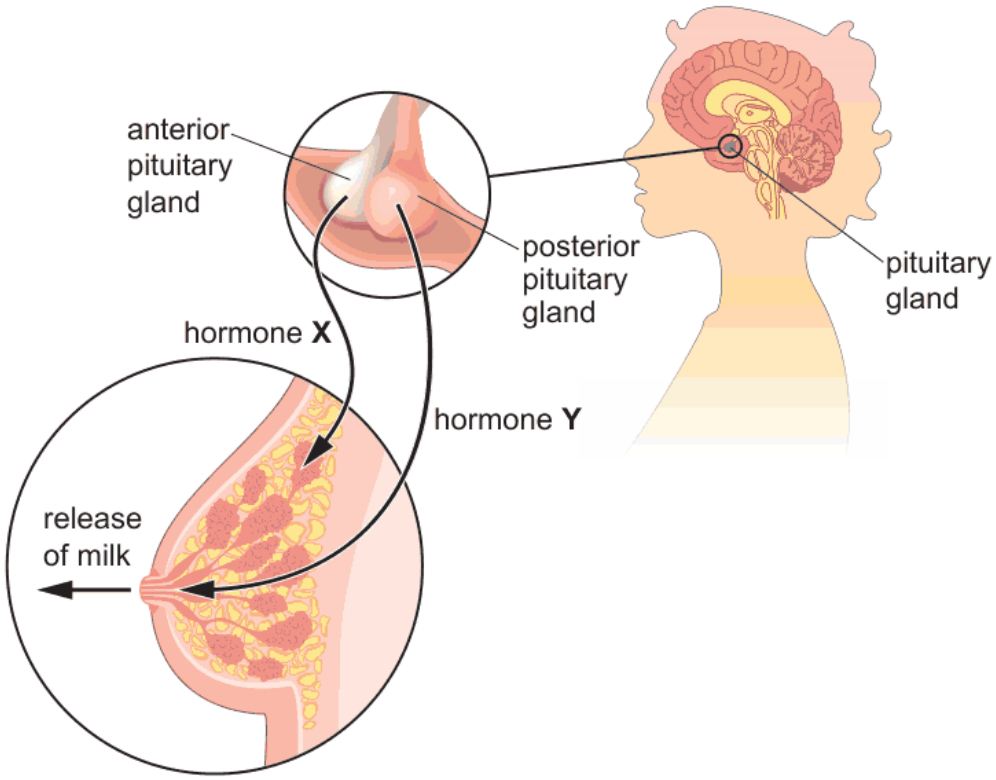
Question 11 · A level Component 2 · Autumn 2020 · Q5(a)(ii) · 3 marks

(ii) With reference to **image 5.1**, conclude how oestrogen and progesterone in the combined contraceptive pill, act to reduce the likelihood of fertilisation. [3]

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(b) During breastfeeding, the baby feeds on milk from the mammary glands. **Image 1.3** shows the site of the action of two hormones involved in the control of lactation.

Image 1.3



(i) Hormone **X** stimulates the production of milk by the mammary glands.
Hormone **Y** stimulates the release of milk from the breast. It also stimulates the contraction of the uterine wall during birth.
Name hormones **X** and **Y**. [2]

X .....

Y .....

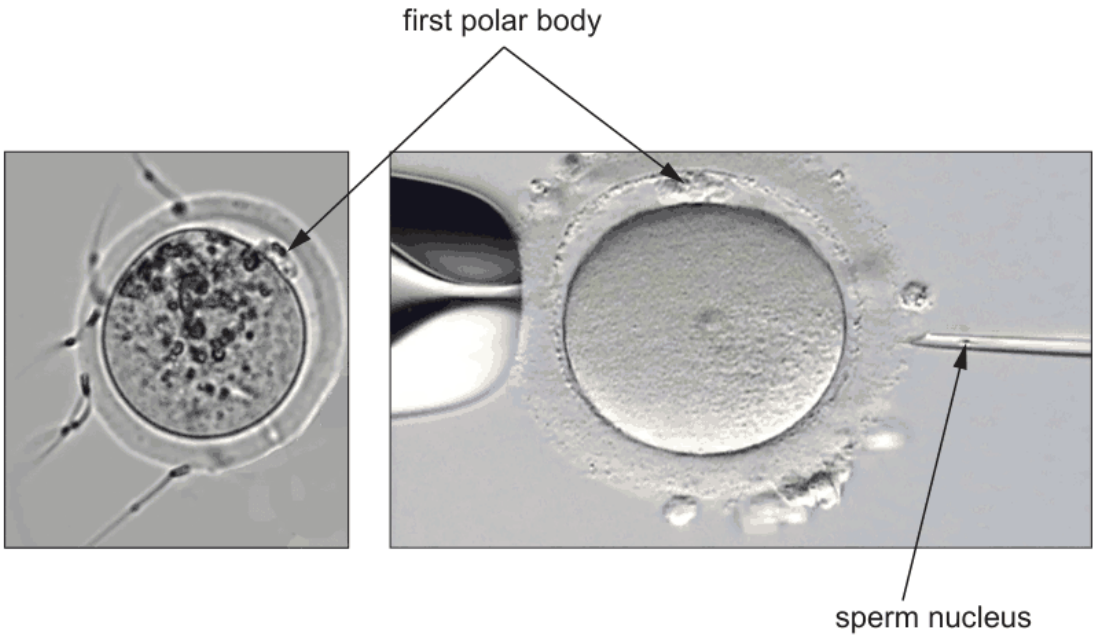
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Question 13 · A level Component 2 · June 2022 · Q3(b)(i) · 2 marks

In vitro fertilisation (IVF) is an option that can enable women who cannot conceive (become pregnant) naturally to have a child. In this process, a secondary oocyte is harvested before ovulation and fertilised outside the body. Two forms of IVF are shown in **Image 3.2**.

- **Image 3.2 A** shows a secondary oocyte exposed to many sperm cells
- **Image 3.2 B** shows a single sperm nucleus being injected into a secondary oocyte.

Image 3.2 A **Image 3.2 B**



(b) (i) Explain why the cell harvested from the Graafian follicle is a secondary oocyte and not a female gamete (ovum). [2]

Question 14 · A level Component 2 · June 2022 · Q3(b)(ii) · 2 marks

(ii) Describe how the entry of more than one sperm nucleus into the secondary oocyte (**Image 3.2 A**) would be prevented. [2]

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Question 15 · A level Component 2 · June 2022 · Q3(b)(iv) · 2 marks

(iv) The first polar body contains the same number of chromosomes as the secondary oocyte, but hardly any cytoplasm. Explain the advantage to the zygote of this unequal division of cytoplasm during the formation of the secondary oocyte. [2]

.....

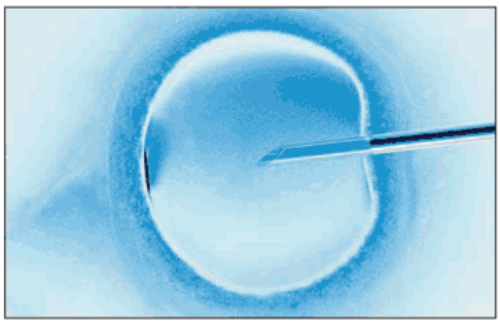
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Question 16 · information from earlier in the question

(c) Some human fertility problems are due to poor morphology (abnormal shape) or poor motility (not moving normally) of spermatozoa. These causes of infertility can be treated by a special type of In Vitro Fertilisation (IVF) called Intra-Cytoplasmic Sperm Injection (ICSI). It differs from conventional IVF in that a single spermatozoon is injected directly into a secondary oocyte, instead of fertilisation taking place in a dish where many spermatozoa are placed near a secondary oocyte.



Intra-Cytoplasmic Sperm Injection

However, fertilisation does not always proceed to completion. A solution of a 'calcium ionophore' may be used to stimulate gated calcium ion channels in the oocyte plasma membrane. Ionophores are molecules that facilitate ion passage in or out of cell membranes.

Question 16 · A level Component 2 · June 2018 · Q2(c)(ii) · 2 marks

(ii) In humans, before fertilisation the oocytes are suspended in metaphase II. Explain how the ionophore molecules might improve the success rate of ICSI. [2]

.....

.....

.....

.....

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(e) A group of scientists used golden hamsters (*Mesocricetus auratus*) to study the acrosome reaction.

Two groups of male hamsters were used.

Group 1: produced normal sperm.

Group 2: genetically modified to produce sperm that did not carry out acrosin production.

Two sets of ova were then taken from female hamsters. These were treated in two different ways.

Set A: Ova were left complete.

Set B: The zona pellucida were removed from around the ova.

The sperm from both groups were then mixed with the ova from each set in vitro.

The percentage of the oocytes that were fertilised was calculated and the results are shown in **Table 4.4**.

Table 4.4

Sperm and ova types	% of oocytes fertilised
Group 1 (normal) sperm with Set A (normal) ova	89
Group 1 (normal) sperm with Set B (no zona pellucida) ova	100
Group 2 (no acrosin) sperm with Set A (normal) ova	0
Group 2 (no acrosin) sperm with Set B (no zona pellucida) ova	100

(i) Use the information given in **Table 4.4** to suggest what conclusions could be made about the role of acrosin. Explain your answer. [3]

This experiment was performed in vitro.

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Question 18 · A level Component 2 · June 2024 · Q1(a)(i) · 2 marks

1. (a) The placenta is the site of exchange between maternal and foetal blood. **Image 1.1** shows a section of the human placenta.

Image 1.1



(i) During pregnancy, the placenta secretes the hormone oestrogen. State **two** effects of oestrogen on the mother's body. [2]

.....

.....

.....

.....

Question 19 · A level Component 2 · June 2024 · Q1(a)(ii) · 2 marks

During human placental development, maternal uterus capillaries are lost and large spaces containing blood are formed (labelled **X** on **Image 1.1**).

(ii) Suggest how this adaptation improves exchange in the placenta. [2]

.....

.....

.....

.....

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Question 20 · A level Component 2 · June 2024 · Q1(d)(i) · 1 mark

(d) During and after birth, the mother's posterior pituitary gland releases the hormones oxytocin and prolactin.

State the effects of:

(i) oxytocin during birth; [1]

.....

.....

Question 21 · A level Component 2 · June 2024 · Q1(d)(ii) · 1 mark

(ii) prolactin after birth. [1]

.....

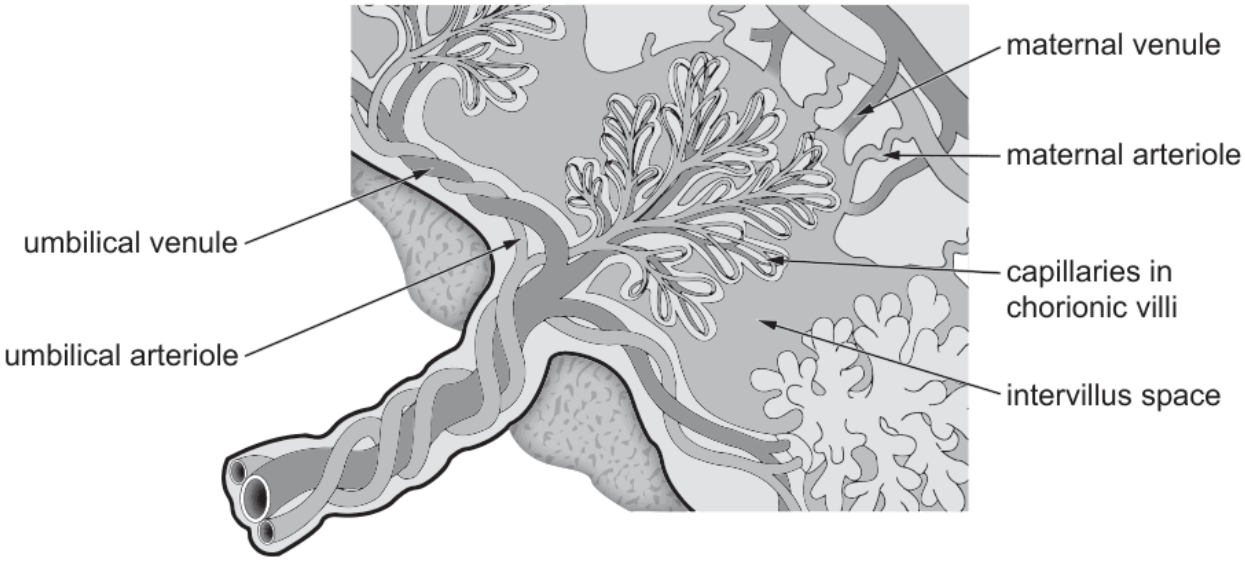
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Question 22 · A level Component 2 · June 2019 · Q5(b) · 2 marks

Figure 5.2 shows the maternal and fetal blood supplies to the placenta.

Figure 5.2



(b) Using appropriate labels from Figure 5.2 describe how the maternal blood flows through the placenta. [2]

Question 23 · A level Component 2 · June 2019 · Q5(c) · 2 marks

(c) Using Figure 5.2 compare the arrangement of blood vessels in the fetal circulation within the placenta with the arrangement of blood vessels in the maternal circulation within the placenta. Explain how this increases the efficiency of exchange. [2]

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Mark schemes

Question 1 · A level Component 2 · June 2022 · Q3(a)(i) · 3 marks

3	(a)	(i)	FSH and LH control the development and release of a secondary oocyte	**A**	3	3
			meiosis I takes place before birth to produce about 100 000 primary oocytes	**A**		
			secretions are neutralised by alkaline seminal fluid during intercourse	**F**		
			oxytocin has a positive feedback effect during birth	**C**		
			All 4 ✓ = 3; 3 ✓ = 2; 2✓ = 1; 0/1 ✓ = 0			

Question 2 · A level Component 2 · June 2022 · Q3(a)(ii) · 1 mark

(ii)	In males **G** (urethra) carries urine and semen **AND** in females only carries urine (1)	1	1	

Question 3 · A level Component 2 · June 2025 · Q1(a) · 3 marks

1	(a)	Sperm is normally deposited during sexual intercourse	E	3	3
		Fertilisation of the ovum normally occurs	A		
		The blastocyst normally implants	D		
		The placenta normally forms	D		
		All 4 for 3 marks 3 for 2 marks 2 for 1 mark			

Question 4 · A level Component 2 · June 2023 · Q4(a)(i) · 2 marks

4	(a)	(i)	Sertoli cells (1) providing {nourishment/ protection} (1)	2	2

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Question 5 · A level Component 2 · June 2023 · Q4(a)(ii) · 3 marks

(ii)	**Any three (x1) from** • Mitosis produces large numbers of (primary) spermatocytes (1) • Meiosis produces {haploid/ owtte} {spermatids/ spermatozoa/ cells} (1) • Meiosis needed for genetic variation/ genetically different cells/ owtte (1) • Large numbers (of spermatozoa) to increase chance of fertilisation (1)	3	3

Question 6 · A level Component 2 · Autumn 2021 · Q3(b)(ii) · 3 marks

	(ii)		A spermatogonia (1) F secondary spermatocytes (1) K spermatids / spermatozoa (1)	3	3

Question 7 · A level Component 2 · June 2022 · Q6(b)(iii) · 2 marks

(iii)	Primary oocyte undergoes meiosis I (1) To produce a secondary oocyte (and the first polar body) (1)	2	2

Question 8 · A level Component 2 · June 2017 · Q6(a) · 2 marks

6	(a)	(Secondary oocyte) passes into the {fallopian tube/ oviduct} (1) (Graafian follicle) develops into corpus luteum (1)	2	2

Question 9 · A level Component 2 · June 2017 · Q6(b)(i) · 4 marks

(b)	(i)	A. FSH stimulates the production of oestrogen (1) B. oestrogen <u>inhibits</u> the {production/release} of FSH (1) C. from Anterior pituitary (1) D. (so that there is negative feedback) which reduces the production of oestrogen/low levels of FSH inhibit oestrogen release (1) E. allowing ovulation (1) in correct context	4	4	

Question 10 · A level Component 2 · June 2017 · Q6(b)(ii) · 3 marks

(ii)		Oestrogen inhibits {<u>production/release</u>} of FSH (1) Without FSH the follicles do not develop (1)ignore development/ of oocytes/release/ovulation of primary oocytes Without a {mature/ Graafian} follicle, ovulation and subsequent fertilisation cannot take place (1)		3	3

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Question 11 · A level Component 2 · Autumn 2020 · Q5(a)(ii) · 3 marks

		(ii)		oestrogen and progesterone inhibit {FSH / hormone A} secretion + follicles do not mature (1) progesterone inhibits {LH / hormone B} secretion + so no ovulation (1) progesterone increases level of mucus in cervix + so blocks entry of sperm (1)			3	3	

Question 12 · A level Component 2 · June 2025 · Q1(b)(i) · 2 marks

(b)	(i)	X = Prolactin (1) Y = Oxytocin (1)		2	2

Question 13 · A level Component 2 · June 2022 · Q3(b)(i) · 2 marks

(b)	(i)	Has not completed meiosis / is suspended in metaphase II / meiosis II only completed {on entry of/when fertilised by} sperm (1) Chromosomes still have two chromatids / only first polar body produced / has not released second polar body (1)	1	1	2	

Question 14 · A level Component 2 · June 2022 · Q3(b)(ii) · 2 marks

(ii)	Cortical reaction /{exocytosis / release (the contents)} of cortical granules (1) Zona pellucida {modified/ thickened} / fertilisation membrane formed (1)	2		2	

Question 15 · A level Component 2 · June 2022 · Q3(b)(iv) · 2 marks

(iv)	(Zygote) contains {(nearly) all/most of} the {cytoplasm/organelles} (1) So can divide rapidly / less time needed between cell divisions/ enough {(named)organelles/ nutrients} present for cell division (1)	1 1	2	

Question 16 · A level Component 2 · June 2018 · Q2(c)(ii) · 2 marks

(ii)	Ca ions enter (the oocyte) (1) Ca ions stimulate (re-initiation of) meiosis (1)	2	2

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Question 17 · A level Component 2 · June 2023 · Q4(e)(i) · 3 marks

(e)	(i)	• Acrosin is needed for fertilisation to occur if zona pellucida present/ no acrosin results in no fertilisation with {normal ova/ with zona pellucida} Acrosin not needed if no zona pellucida present (1) • Acrosin {hydrolyses/breaks} down the zona pellucida (1) • Acrosin doesn't always fully break down the zona pellucida (1)	3	3	3

Question 18 · A level Component 2 · June 2024 · Q1(a)(i) · 2 marks

1	(a)	(i)	**Any two (x1) from** • {stimulates the growth / owtte} of the uterus (to accommodate the growing foetus) (1) • stimulates the {growth / development} of the mammary glands (during pregnancy) / owtte (1) • inhibitory effect on {FSH / LH} (1)	2	2

Question 19 · A level Component 2 · June 2024 · Q1(a)(ii) · 2 marks

(ii)	Maternal blood in {direct contact / bathes} with chorionic villi / fewer membranes(1) Shorter diffusion distance (1)	2	2

Question 20 · A level Component 2 · June 2024 · Q1(d)(i) · 1 mark

(d)	(i)	(Stimulates) contraction of {uterus (wall) / myometrium} (1) ignore endometrium	1	1

Question 21 · A level Component 2 · June 2024 · Q1(d)(ii) · 1 mark

(ii)	(Stimulates) production of milk (1)	1	1

Question 22 · A level Component 2 · June 2019 · Q5(b) · 2 marks

	(b)			In through <u>maternal</u> arteriole into {intervillus space/ lacuna} (1) out through <u>maternal</u> venule (1)	2		2	

Question 23 · A level Component 2 · June 2019 · Q5(c) · 2 marks

	(c)			no capillaries present between maternal arteriole and maternal venule (1) One less layers of cells for materials to cross/shorter diffusion path/ (pooling effect of blood) allows more time for diffusion (1) 2nd mp linked to 1st mp	2		2	

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