PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 7: ANIMAL COORDINATION, CONTROL AND HOMEOSTASIS (PACK 3)

SCORE	PERCENTAGE
/96	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Additional guidance	Mark
	An explanation linking **four** from: **Clomifene (maximum two marks)** • clomifene therapy introduces hormones into the body / stimulates hormones {LH / FSH} (1) • to allow (more) eggs to {develop / be released} (1) **IVF (maximum two marks)** • IVF involves fertilisation outside the body (1) • so a fertilised egg cell can be implanted directly into the uterus (1) • so if Fallopian tubes are blocked there can still be pregnancy (1)	accept womb for uterus accept alternative reasons for using IVF	**(4)** **AO1 1**

Q2.

Question number	Indicative content	Mark
	AO1 • There are four hormones involved in the menstrual cycle oestrogen, progesterone, LH and FSH • At the start of the cycle FSH causes the egg to develop in the follicle • FSH is released from the pituitary gland • As progesterone and oestrogen levels are low • Oestrogen levels start to rise • Oestrogen is released from the ovaries • This causes the lining of the uterus to build up • High levels cause a surge of LH • Released from the pituitary gland • Causing ovulation • An egg is released from the ovary • Progesterone is produced • From the corpus luteum • This caused the lining of the uterus to be maintained • If an egg is fertilised oestrogen and progesterone levels remain high • To maintain the lining of the uterus	**(6)** **AO1.1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Either a list of two or more hormones or a hormone linked to its role in the menstrual cycle/or the endocrine gland it is released from • There must be a coherent flow to the answer linking the correct hormone with the correct role
Level 2	3-4	• At least two hormones of the menstrual cycle linked to their role or the endocrine they are released from • Answer must be correctly linked and in a logical order although the candidate may start at any point within the menstrual cycle
Level 3	5-6	• Links at least three hormones of the menstrual cycle to their role and endocrine gland they are released from • Answer must be logically ordered and links must be correctly made only minor errors are acceptable

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1	• FSH and LH control the menstrual cycle / LH controls ovulation and the uterus thickening (note an error here)
	2	• LH controls ovulation
Level 2	3-4	• Oestrogen causes the uterus lining to thicken and LH to be released which causes ovulation • Oestrogen causes the uterus lining to thicken and LH to be released from the pituitary gland
Level 3	5-6	• FSH causes the egg to mature in the follicle, oestrogen causes the thickening of the uterus lining and causes LH to be released which results in ovulation. • FSH and LH are released from the pituitary gland, Oestrogen and progesterone are released from the ovaries. FSH causes the egg to mature in the follicle, oestrogen causes the thickening of the uterus lining and causes LH to be released which results in ovulation.

Q3.

Question number	Answer	Mark
	An explanation including **four** of the following: • Low levels of thyroxine cause TRH to be produced (1) • (TRH is produced) in the hypothalamus (1) • this causes TSH to be released (1) • (TSH is released) from the pituitary (1) • (TSH causes the) thyroid gland to produce thyroxine (1) • As thyroxine levels increase it inhibits the {release of TRH / production of TSH} (1)	**(4)** **AO1.1**

Q4.

Question number	Indicative content	Mark
	AO1 Ultrafiltration • Blood enters the nephron into the glomerulus • Then is filtered under pressure into the Bowman's capsule/renal capsule Selective reabsorption • The filtrate enters the (proximal convoluted tubule • Where glucose is reabsorbed • By selective reabsorption • Active transport • Using energy from respiration • Through the loop of Henlé • Where water and ions are exchanged • Into the (distal convoluted) tubule Urine formation • The filtrate enters the collecting duct • Where waste products/urea and excess water are removed from the body • Urine id formed from water and urea	**(6)** **AO1 1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Gives at least one structure of the nephron or a simple description of a process occurring in the nephron • Links one structure of the nephron to its function e.g. glomerulus filters the blood or links two parts of the nephron in the correct order e.g. filtrate travels from glomerulus to Bowman's capsule
Level 2	3-4	• Links at least two structures to their function or process • Both structures must be correctly linked to their function in the correct order
Level 3	5-6	• Describes the flow of filtrate through the kidney linking at least three structures linked to their function or process • Three structures must be linked to their function in the correct logical order to include two of ultrafiltration, selective reabsorption and urine formation

Level	Mark	Example responses
	0	• No rewardable material.
Level 1	1-2	• The blood enters in the glomerulus • The blood is filtered in the glomerulus
Level 2	3-4	• The blood is filtered in the glomerulus and enters the Bowman's capsule where the filtrate moves into the rest of the nephron • The blood is filtered in the glomerulus and enters the Bowman's capsule where the filtrate moves into the rest of the nephron and urine is collected in the collecting duct
Level 3	5-6	• The blood is filtered into the nephron through the glomerulus and the Bowmans capsule. It enters the first tubule and substances are reabsorbed by diffusion. The waste products pass to the collecting duct where urine in formed. • The blood is filtered into the nephron through the glomerulus and the Bowmans capsule this is called ultrafiltration. It enters the first tubule and substances are reabsorbed by diffusion and substances like glucose are selectively reabsorbed. The filtrate moves through the loop of Henlé where some eater is reabsorbed. The waste products pass to the collecting duct where urine in formed.

Q5.

Question number	Answer	Mark
	An explanation linking two from: • sweat/water is released onto the skin (1) • is evaporated (1) • transferring {thermal energy / heat} (1)	**(2)** AO1 1

Q6.

Question number	Answer	Additional guidance	Mark
	An explanation linking four of the following: • adrenalin acts to increase heart rate / blood pressure (1) • so there is increased blood flow (1) • causes the release of glucose from glycogen (1) • so increased {oxygen/glucose} (1) • increased the rate of respiration (1) • to **release energy** (for the working muscles/body) (1)	accept more glucose released from liver/muscles accept ATP for energy	**(4)** AO 1 2

Q7.

Question number	Answer	Mark
(i)	An explanation linking **two** of the following: • women over the age of 50 have low levels of oestrogen (1) • (high levels of) oestrogen are needed for **LH** to be released / levels of oestrogen are too low for **LH** to be released (1) • (a surge of) LH is needed for ovulation to occur (1)	**(2)** AO 3 1a AO 3 1b

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • low levels of oestrogen (1) • (low levels of oestrogen) stops the lining of the uterus building up / so no lining to be lost (1)	reject progesterone	**(2)** AO3 2a AO3 2b

Question number	Answer	Additional guidance	Mark
(iii)	An explanation linking the following: • causes the release of FSH (1) • stimulating eggs to develop (in the follicles/ovary) (1) OR • causes the release of LH (1) • stimulating ovulation (1)	accept stimulates follicles to mature	**(2)** AO 2 1

Question number	Answer	Mark
(iv)	A corpus luteum **1. The only correct answer is A** ***B*** *is not correct because The pituitary gland releases the hormones LH and FSH not progesterone* ***C*** *is not correct because the thyroid gland releases TSH and thyroxine not progesterone* ***D*** *is not correct because the uterus does not release any hormones it is the site of the action of progesterone*	**(1)** AO 1 1

Q8.

Question Number	Answer	Additional Guidance	Mark
	An explanation linking: • blood glucose levels are not regulated / high (1) • because cells are resistant to insulin (1) • (so the liver) does not convert glucose to glycogen (1)	accept blood sugar levels accept there is insulin resistance / unresponsive to insulin reject immune accept hyperglycaemia / symptoms of hyperglycaemia (1)	**(3)** **AO1**

Q9.

Question number	Answer	Mark
(a)	C	**(1)**

Question number	Answer	Mark
(b)(i)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (2 marks): • ultrafiltration occurs in the glomerulus where the liquid part of the blood passes into the Bowman's capsule (1) • reabsorption takes place as it travels through the proximal convoluted tubule into the loop of Henle (1) • finally urine production occurs in the collecting duct and excess fluid and sodium ions are removed (1)	**(3)**

Question number	Answer	Mark
(b) (ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • the kangaroo rat lives in the desert so it needs to retain as much water as possible (1) • as most water is reabsorbed in the loop of Henle, a longer loop gives more surface area for water reabsorption (1)	(2)

Question Number	Indicative content	Mark
* (b)(iii)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO2 (6 marks)** water content • increased ADH causes more water to be reabsorbed into the bloodstream • prevents dehydration • decreased concentrations of ADH cause less water reabsorption • greater volume of urine produced • at 0.0 mol/dm^{-3} of sodium ions the volume of ADH stored is at its highest • so the lowest amount of ADH is released • water levels in the body are regulated sodium ions • as sodium ion concentration increases the levels of ADH stored decrease • at 0.25 mol/dm^{-3} ADH stored reduced by 5 au • so a small amount of water is reabsorbed • at 0.50 mol/dm^{-3} ADH stored reduced by a further 30 au • a greater amount of water is reabsorbed • the volume of ADH stored remains stable at 8 au • causing the maximum amount of water to be reabsorbed • preventing dehydration when sodium levels are high	(6)

Level	Mark	Descriptor
	0	No awardable content
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Q10.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • (internal) temperature is kept at the {**optimum** / best / 37°C} (1) • for enzyme action / (chemical) reactions to take place (1)	accept at high temperatures enzymes will denature (2)	**(2)** AO1 1

Q11.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • to inhibit the production of FSH (1) • to prevent eggs maturing (1) OR • to inhibit the production LH (1) • so ovulation is prevented (1)	 accept thickens mucus (1) to prevent sperm reaching the egg/ entering the uterus (1) accept thins lining of the uterus (1) so less chance of implanting (1)	**(2)** AO1 1

Q12.

Question number	Answer	Additional guidance	Mark
(i)	excess glucose (in the urine) / (symptom of) constant thirst / fainting	reject albumin /leukocytes	**(1)** AO3 2a

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • protein levels were above the normal range (1) • indicating bacteria / pathogens present (1) OR • leukocytes were above the normal range / 40 leukocytes (1) • indicating bacteria / pathogens present (1)	 reject pH levels reject pH levels	**(2)** AO3 2b

Q13.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (6 marks)** Reabsorption of glucose • in the proximal convoluted tubule • by selective reabsorption • as active transport • against the concentration gradient • using energy from respiration Why glucose is in the urine of a person with untreated diabetes. • glucose levels are not controlled • so glucose levels in the blood are very high • not all glucose can be selectively reabsorbed • so passes through the nephron into the collecting duct	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3–4	• Demonstrates elements of biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Q14.

Question Number	Answer	Acceptable answers	Mark
(a)	An explanation linking **four** of the following points: • (dehydration detected by) osmoreceptors/hypothalamus (1) • pituitary gland (1) • (releases more) ADH (1) • ADH acts on the nephron/collecting duct/tubules (1) • making the {collecting duct/tubules/nephron} more permeable (1) • so **more** water is reabsorbed (by the body/blood) (1)	ignore brain accept {small amount/concentrated} urine produced	**(4)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	**A** corpus luteum		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	• uterus lining remains thick/uterus lining continues to grow (1)		**(1)**

Question Number		Indicative Content	Mark
QWC	**(b) (iii)***	A explanation to include some of the following points Stages and hormones • menstrual cycle consists of menstruation, uterus lining thickening and ovulation • hormones involved in the menstrual cycle are oestrogen, progesterone, FSH and LH Role of the hormones • FSH stimulates the follicles to mature • FSH stimulates the production of oestrogen • follicles secrete oestrogen • oestrogen is responsible for the repair of the uterus wall • high levels of oestrogen stimulate the release of LH • LH triggers ovulation • corpus luteum produces progesterone • progesterone maintains the lining of the uterus Control mechanisms • oestrogen inhibits the production of FSH • progesterone inhibits the production of LH • progesterone inhibits the production of FSH • menstruation is triggered by low levels of oestrogen and progesterone • Low progesterone levels cause FSH to be released	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• A limited explanation of the menstrual cycle which might include at least one of the stages **or** some of the hormones involved **or** the role of one of the hormones involved • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• A simple explanation of the menstrual cycle including some of the stages **and** the role of at least two of the hormones involved • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• A detailed explanation of the menstrual cycle including most of the hormones involved, their roles **and** at least one control mechanism • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Q15.

Question Number	Answer	Mark
(i)	**A** pituitary | ovaries	**(1)**

Question Number	Answer	Mark
(ii)	An answer that combines a maximum of two points of interpretation/evaluation to provide a logical description: • as oestrogen level peaks the temperature is at its lowest (day 12)(1) • as oestrogen levels fall there is a temperature rise (days 12 – 15) (1) • temperature remains high with higher oestrogen levels (days 15 – 25)(1)	(2)

Question Number	Answer	Additional guidance	Mark
(iii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • there is a drop in body temperature prior to ovulation (1) • identifies the time when the egg is released (1)	accept best time for intercourse to take place to increase the chance of fertilisation (1)	(2)

Q16.

Question Number	Answer	Additional guidance	Mark
	An explanation linking **four** from: • because excess amino acids are broken down into urea (1) • amino acids broken down in the liver (1) • it is then transported in the blood to the kidney (1) • enter the nephron (1) • during ultrafiltration (1) • pass through the nephron / not reabsorbed back into the blood (1) • (so urine with a high concentration of urea) forms in the collecting duct (1)	accept deamination accept named blood vessels accept Bowman's capsule / renal capsule / glomerulus accept bladder for collecting duct	**(4)** **AO1 1**

Q17.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (6 marks)** • FSH released by pituitary gland • stimulates eggs to mature in the follicle • FSH triggers a rise in oestrogen • oestrogen released from the ovaries • oestrogen causes the lining of the uterus to build up • high levels of oestrogen stimulate LH production • surge of LH from the pituitary gland • triggers ovulation • progesterone is produced by the corpus luteum • progesterone maintains the lining of the uterus • high levels of oestrogen and progesterone inhibit LH and FSH production • as progesterone levels fall menstruation occurs • low levels of progesterone and oestrogen restart the cycle	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3–4	• Demonstrates elements of biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Q18.

	Answer	Acceptable answers	Mark
(a)	Gametes correctly labelled (1) X X X Y Female zygote X X Male zygote X Y (1)	X X Y X	**(2)**

(b)	**A** ☒ enzymes to help get through the membrane of the egg cell		**(1)**
(c)	to supply / contain (a large amount of) nutrients / energy (for the zygote / embryo)	food /named nutrient Ignore references to foetus Reject baby	**(1)**
(d)	An explanation linking **two** of the following: • rising oestrogen levels (1) • (stimulate production of) LH (1) • (LH) levels increase / when it reaches a set level / peaks (which causes ovulation) (1)	accept high oestrogen levels / oestrogen peaks / oestrogen released	**(2)**
(e)	An explanation linking: • Uterus lining maintained/ thickened (more) (1) With one of: • Because progesterone levels maintained / progesterone is still produced • So that the embryo can embed on it / So that the uterus lining can supply the embryo with nutrients	Reject: repairs	**(2)**

Q19.

Question Number	Answer	Mark
(i)	B female condom **The only correct answer is B** ***A*** *is incorrect because oral contraception contains hormones* ***C*** *is incorrect because the rhythm (calendar) method does not involve a barrier* ***D*** *is incorrect because the contraceptive implant contains hormones*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
(ii)	barrier methods prevent the transmission of STIs	accept STDs / accept named STIs accept for extra protection against pregnancy	**(1)** **AO2 1**

Q20.

Question number	Answer	Additional guidance	Mark
(i)	pituitary (gland)	accept phonetic spelling	**(1)** AO1 1

Question number	Answer	Additional guidance	Mark
(ii)	A description including: • one or more ova will start to **mature** (1) • (inside the) follicles (1) • oestrogen is released (1)	 accept eggs will mature	**(2)** AO2 1

Question number	Answer	Mark
(iii)	**A LH** **A. The only correct answer is A** ***B** is not correct because FSH stimulates the follicles to mature oocytes* ***C** is not correct because it is not a hormone associate with the menstrual cycle* ***D** is not correct because it maintains the lining of the uterus it does not cause ovulation*	**(1)** AO1 1

Question number	Answer	Mark
(iv)	An explanation linking two from: • (day 20) is after ovulation / after the egg has been released (1) • so the corpus luteum produces progesterone (1) • to maintain the **lining** of the uterus (1)	**(2)** AO2 1