OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



MARK SCHEME

B3.2 COORDINATION AND CONTROL: THE ENDOCRINE SYSTEM

SCORE	PERCENTAGE
/100	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

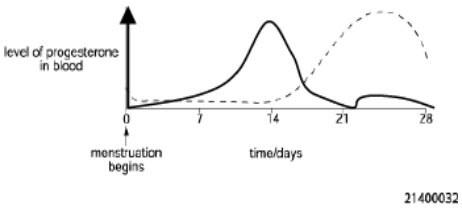
What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Question			Answer/Indicative content	Marks	Guidance
1			B	1	
			Total	**1**	
2			D	1	
			Total	**1**	
3			D	1	
			Total	**1**	
4			C	1	
			Total	**1**	
5			D	1	
			Total	**1**	
6	a	i			before / around day 14
		i	line rises and falls (1)	1	
		i	peaks before progesterone (1)	1	
		ii	FSH stimulates oestrogen production (1)	1	
		ii	oestrogen inhibits FSH production (1)	1	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
	b		* Please refer to the marking instructions point 10 for guidance on how to mark this question. **Level 3** **(5–6 marks)** **An explanation as to how the effects of endometriosis could be relieved by treatment with progesterone.** *There is a well–developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2** **(3–4 marks)** **An explanation of the effects of the levels of oestrogen and progesterone levels and their effect on the endometrial cells outside the uterus.** *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1** **(1–2 marks)** **Draws a simple explanation of how the hormones affect the endometrial cells.** *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** *No response or no response worthy of credit.*	6	**AO3.1b: Analysis of the information and evaluation of the effect of the treatment** • To stop the cells building up oestrogen levels should be kept low • Cell build up can be reduced by keeping progesterone levels high • Progesterone can be given as a (contraceptive) pill to maintain high levels of progesterone • Progesterone mimics pregnancy and halts the menstrual cycle **AO2.1: Applying knowledge of hormone levels to endometriosis / endometrial cells** • An explanation that when oestrogen levels are high the levels of progesterone are low • An explanation that the (endometrial) cells outside the uterus would build up and breakdown as normal • An explanation that during the breakdown stage the cells would not be able to leave the body in the normal way **AO1.1: Demonstrate knowledge and understanding of the female sex hormones and menstruation** • A simple explanation of the effect of oestrogen on the cells of the womb during menstruation from the graph e.g. builds up the cell lining of the uterus • A simple explanation of the effect of progesterone on the cells of the womb during menstruation from the graph e.g. maintains the cell lining of the uterus
			Total	**10**	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
7			[Level 3] Answer gives a full description of the effect of plant hormone **and** correctly works out the concentration of the plant hormone solution. (5 – 6 marks) [Level 2] Answer includes a correct statement about the effect of plant hormone **and correctly measures the stem. or** gives a full description of the effect of plant hormone **or** correctly works out the concentration of the plant hormone solution. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] Answer includes a correct statement about the effect of plant hormone **or** correctly measures the stem. (1 – 2 marks) [Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	This question is targeted up to grade E Indicative scientific points about the effect of plant hormone may include: • The plant hormone causes the stem to get longer • Increasing concentration of hormone causes greater elongation • At higher concentrations any increase in concentration has not further effect on growth • Reference to maximum percentage concentration or length Indicative scientific points about the piece include: • The length is 20mm • This would be caused by a concentration of 3 parts per million allow concentration in range 2.5 – 3.5 ppm Use the L1, L2, L3 annotations in Scoris; do not use ticks.
			Total	6	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
8			[Level 3] gives an explanation of the effect of plant hormone AND correctly works out the concentration of the plant hormone solution. (5 – 6 marks) [Level 2] correctly works out the concentration of the plant hormone solution OR gives an explanation of the effect of plant hormone AND makes a partial attempt at working out the concentration of the plant hormone solution Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] gives an explanation of the effect of plant hormone OR makes a partial attempt at working out the concentration of the plant hormone solution (1 – 2 marks) [Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	This question is targeted up to grade A* Indicative scientific points about explaining the effect of plant hormone may include: • The plant hormone causes growth / stem gets longer / stem now 25mm • This is due to promoting cell elongation • as concentration of hormone increases so does % change in length Indicative scientific points about the piece include: • Calculation to show that this is a 5mm increase • This corresponds to a 25% (increase) • This must have been caused by a plant hormone concentration of 28 (parts per million) Use the L1, L2, L3 annotations in Scoris; do not use ticks.
			Total	6	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
9			[Level 3] Makes more than two comparison between the two graphs AND explains in detail how the pill prevents pregnancy Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] Makes at least two comparison between the two graphs AND attempts to explains in detail how the pill prevents pregnancy Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] Makes at least one comparisons between the two graphs **and** one simple explanation of how pill works OR Attempts to explains in detail how the pill prevents pregnancy Quality of written communication impedes communication of the science at this level. (1 – 2 marks) [Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	This question is targeted at grades up to A* Indicative scientific points that may be included detailed explanation • the pill prevents the **release** of **FSH** • **FSH** needed for egg development / no egg development as no or low levels of **FSH** • the pill **or** lack of **FSH** prevents the **release** of **LH** • **LH** controls **ovulation** / no **ovulation** as no or low levels of **LH** • idea that **oestrogen** peak needed for ovulation / as there is no oestrogen peak there is no ovulation • **ignore** reference to uterus wall **if no other explanation for FSH and LH identified then allow** FSH and LH are needed for egg development and ovulation as a single detailed explanation **simple explanation** • pill mimics pregnancy • pill prevents ovulation / no egg develops/ no egg released **comparing the graphs** • **FSH** constant in graph **B** / peaks in **A** • **FSH** levels low or no **FSH** in graph **B** / high in graph **A** • **LH** constant in graph **B** / peaks in **A** • **LH** levels low or no **LH** in graph **B** / high in graph **A** • **progesterone** rises remains high then falls in **B** / fluctuates in **A** **/progesterone** level in **B** constant / varies in **A** **/progesterone** levels high in graph **B** / low in **A** • **oestrogen** constant in **B** / fluctuates in **A** / **oestrogen** no peak in **B** / has (two) peaks in **A** allow pill for graph B and 'normal' for graph **A** Use the L1, L2, L3 annotations in Scoris; do not use ticks.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
			Total	6	
10			C ✓	1 (AO 2.2)	Examiner's Comments The question assessed understanding of results from practical experiments on phototropism and the way light affects the tip of a growing shoot. Most candidates made a choice between A and D. Clearly there is a misconception that plants will show phototropic responses even when the tip is covered. Alternatively, they may have misunderstood the purpose of the light-proof cap. This could be used as a focus when teaching about phototropism.
			Total	1	
11			C ✓	1 (AO 1.1)	
			Total	1	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

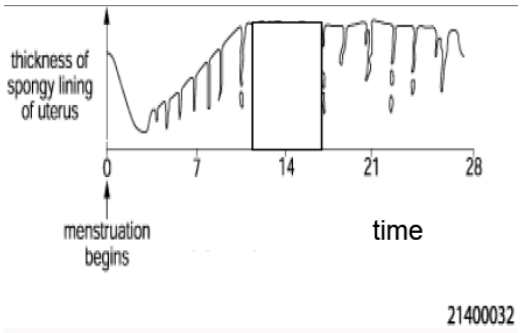
STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
12	a		in the blood(stream)✓	1 (AO 1.1)	<u>Examiner's Comments</u> The question assessed AO1.1 recall of hormone transport. Although candidates generally answered this successfully, some did not gain marks because their response was a specific blood cell either red or, in some cases, white. Clear misunderstanding was demonstrated by candidates whose response referred to the nervous system.
	b		brain✓ egg✓ oestrogen✓ progesterone✓	4 (AO 4 x 1.1)	ALLOW estrogen <u>Examiner's Comments</u> Here AO1.1 recall was assessed for the role of hormones in the menstrual cycle. Most candidates gained one mark for the egg. Some also identified the brain and some got all four marks. However, occasionally candidates unfortunately got the two hormones the wrong way around.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
	c	i	letter **E** marked on day 14✓	1 (AO 2.1)	 tolerance area inside white box Examiner's Comments Candidates had to apply their knowledge to the diagram. Many candidates gained credit within the tolerance limits. However, there were many no responses, and this is something that candidates should avoid on this type of question.  Examination technique should encourage them to put the letter somewhere on the diagram, even if they are not sure of the correct response.
		ii	lining breaks down / is shed✓	1 (AO 1.1)	**ALLOW** menstruation / a period occurs **ALLOW** unthickens/thickness reduces/gets thinner/decreases Examiner's Comments This AO1.1 question assessed recall of events during the menstrual cycle. Candidates generally answered this question successfully.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
	d		mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Applies knowledge of hormonal and one non–hormonal method of contraception. **AND** Interprets data to explain more than one difference in effectiveness between hormonal and non–hormonal contraceptives. **AND** Makes at least one judgement to explain why the pill is a popular method of contraception. *There is a well–developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Any **two** of: Applies knowledge of hormonal and one non-hormonal method of contraception. **OR** Interprets data to explain one difference in effectiveness between hormonal and non–hormonal contraceptives. **OR** Makes at least one judgement to explain why the pill is a popular method of contraception. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Applies knowledge of at least one hormonal and one non-hormonal method of contraception. **OR** Interprets data to explain at least one difference in effectiveness between hormonal and non-hormonal contraceptives. **OR** Makes at least one judgement to explain why the pill is a popular method of contraception.	6 (AO 2 x 2.1) (AO 2 x 3.1a) (AO 2 x 3.2a)	**AO2.1 Apply knowledge and understanding of methods of contraception.** • Sterilisation prevents the release of sperm • Hormonal methods prevent ovulation • Diaphragm / condom prevent sperm meeting egg / are barrier methods **AO3.1a Analyse information and ideas to interpret the data to explain differences between effectiveness of contraceptives.** • hormonal methods more reliable than non–hormonal barrier methods • due to (named) hormonal methods being easy to use/less awkward in use • (named) non–hormonal barrier methods less reliable as awkward in use • non–hormonal methods show more variation in reliability **AO3.2a Analyse information and ideas to make judgements to explain why the pill is a popular method.** • pill is easier to use than the patch/injectable so preferable to the safer injection • much more reliable than condom/diaphragm but easier to reverse decision than sterilisation Examiner's Comments This Level of Response question assessed application, AO2, and analysing information, interpreting and forming judgements, AO3. To be successful in this question it was important that candidates gave a balanced response that covered all assessment objectives. Candidates were able to demonstrate some understanding of the types of contraception. Many were able to justify the use of the pill as a hormonal method that was relatively easy to use compared to other forms of

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

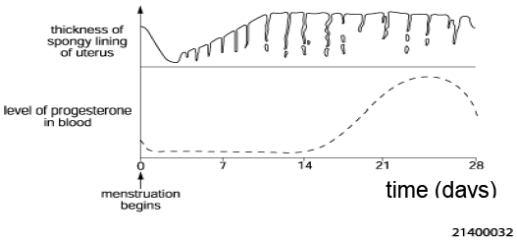
STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
			There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant. 0 marks *No response or no response worthy of credit.*		hormonal contraception. Some candidates understood how hormonal methods worked and others knew the action of non-hormonal barrier methods, but it was very rare to see candidates who described the action of both hormonal and non-hormonal methods. The most common error in interpreting the data in the table was to assume the one with the highest number was the most reliable. Where candidates were awarded Level 2, this was usually because they had analysed and interpreted the data in the table and used this to form a judgement as to why the pill was a popular method of contraception.
			Total	13	
13			B ✓	1 (AO 1.2)	
			Total	1	
14			D ✓	1 (AO 2.1)	
			Total	1	
15			A ✓	1 (AO 1.1)	
			Total	1	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
16	a		adrenaline reduces blood flow to the skin ✓ less blood lost (during time to clot/receive medical treatment) ✓	3 (AO 1.1) (AO 2.1)	ALLOW causes vasoconstriction **in skin** IGNORE stops bleeding Examiner's Comments Very few candidates appreciated that adrenaline would reduce the blood flow to the skin. Many assumed that it would simply increase heart rate and that this would somehow make the blood more likely to clot at the wound.
	b	i	corpus luteum / (empty) follicle / yellow body ✓	1 (AO 1.1)	Examiner's Comments There were a number of correct references to corpus luteum, yellow body or empty follicle.
		ii	smooth curve drawn rising and falling ✓ fall must start on day 21 or after ✓	2 (AO 2 × 1.1)	 if no fall in progesterone then award 0 marks Examiner's Comments Most candidates correctly appreciated that the line should increase, plateau and then fall.
	c	i	**First check answer on answer line** **If answer = 19.98 (mm) award 3 marks** 20 - 0.025✓ but 19.975 (mm)✓ 19.98 (mm)✓	3 (AO 2 × 2.2) (AO 1.2)	Examiner's Comments The manipulation of standard form was often correct in this question.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
		ii	lining is not repaired correctly✓	1 (AO 1.1)	ALLOW lining will not thicken / not build up IGNORE lining will not be maintained / will become thinner Examiner's Comments There was some confusion in the answers between the roles of progesterone and oestrogen. Common incorrect answers referred to the breaking down of the uterus lining.
		iii	Any three from: gonadotrophins used✓ FSH and LH used✓ FSH lead to ripening of follicle✓ and LH causes ovulation✓ human chorionic gonadotrophin✓ causes egg/ovum to mature inside follicle✓	3 (AO 3 × 1.1)	ALLOW stimulate egg production/development Examiner's Comments Candidates often gave the hormones that might be given to women to treat infertility, i.e. LH and FSH but did not specifically link them to their function. This is illustrated in exemplar 7, which would only gain one mark for naming the two hormones. Exemplar 7 (iii) Explain how hormones can be used to treat infertility in women. Drugs with menstrual hormones in - eg: FSH and LH complete negative feedback to produce more oestrogen and increase the number of eggs matured & developed. [3]

Question			Answer/Indicative content	Marks	Guidance
		iv	order of bases is changed (in gene)✓ order of amino acids changed in protein / change in shape of the enzyme✓	2 (AO 1.1) (AO 2.1)	ALLOW nucleotides ALLOW mutation in base sequence ALLOW different amino acids in protein IGNORE codes for wrong amino acid to be made <u>Examiner's Comments</u> Many candidates correctly linked changes in the DNA base sequence to alterations in the amino acids in the protein or the shape of the protein molecule.
			Total	14	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
17	a		flower opening ✓ germination ✓ shedding of leaves✓	3 (AO 1.1)	Examiner's Comments This AO1.1 question rarely scored full marks. Often candidates scored 1 or sometimes 2 marks but there was no obvious pattern to which ones they got correct.
	b	i	plant B has grown in the direction of/towards the light source ✓ tropic response is positive ✓	2 (AO 3.1a)	ALLOW in plant A it is still showing phototropism to the light source above IGNORE movement ALLOW positive phototropism is correct Examiner's Comments This AO3.1 question did see most candidates score at least 1 mark. This was identifying that the sister had said it was 'positive'. Candidates sometimes did not gain credit on the first marking point because they did not give any indication it was growth of the plant to the light source.
		ii	auxin ✓	1 (AO 1.1)	ALLOW IAA/indole acetic acid Examiner's Comments Again, this AO1.1 recall question was reasonably well answered, although there was some confusion with some candidates putting insulin.
	c	i	FSH ✓ follicle✓ progesterone ✓	3 (AO 1.1)	Examiner's Comments This AO1.1 recall question discriminated well, and a full range of responses were seen. The most common correct response where only 1 mark was scored was progesterone. Fetus rather than follicle was seen quite often.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
		ii	Days 3 – 6 ✓	1 (AO 2.2)	<u>Examiner's Comments</u> This AO2.2 question testing mathematical skills did gain credit with higher ability candidates. The most common incorrect answer was 4-7 days.
	d		**Any three from:** mitosis ✓ DNA replicates ✓ chromosomes separate ✓ cells divide into two new cells ✓ cells grow ✓	3 (AO 1.1)	**ALLOW** chromosomes are copied **ALLOW** DNA duplicates/doubles **ALLOW** (identical) daughter cells produced each with own copy of chromosomes **ALLOW** cell splits into two <u>Examiner's Comments</u> A large number of candidates found this AO1.1 question about cell division challenging and did not identify it as asking about how new cells are made, so did not make the link to cell division. Many described how the menstrual cycle was controlled by hormones and how they affected the thickness of the lining. There were some very good responses from those candidates that recognised this was about cell division but some mentioned meiosis rather than mitosis.
			Total	**13**	
18			C	1 (AO 1.1)	
			Total	**1**	
19			B	1 (AO 2.1)	<u>Examiner's Comments</u> Many candidates chose distractors C or D as their answers.
			Total	**1**	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
20	a	i	progesterone ✓	1 (AO 2.1)	
		ii	any two from oestrogen / FSH / LH ✓	1 (AO 1.1)	
	b		**Any four from:** treatment contains oestrogen / progesterone / both oestrogen and progesterone ✓ inhibits LH ✓ prevents ovulation ✓ inhibits FSH ✓ prevents egg maturing ✓ thickens mucus ✓	4 (AO 1.1)	**ALLOW** inhibits LH which controls ovulation = 2 marks **ALLOW** inhibits FSH which matures eggs = 2 marks **ALLOW** produces mucus Examiner's Comments A small number of candidates confused fertility treatment with contraception and so referred to the use of FSH or LH. However, the majority could correctly explain why oestrogen and/or progesterone were used.
	c		gibberellins breaks seed dormancy / elongation of shoots ✓ ethene stimulates fruit ripening ✓	2 (AO 1.1)	**ALLOW** stimulates flowering / fruit development / fruit growth / seed formation / germination / growth of shoots **DO NOT ALLOW** fruit ripening **ALLOW** dropping of leaves/fruit / stimulates fruit maturation Examiner's Comments Many answers correctly referred to the action of gibberellins in breaking seed dormancy and the action of ethene in controlling fruit ripening. A number of marks were lost through inaccurate answers such as the 'control of plant ripening'.
			Total	8	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
21			B ✓	1 (AO2.1)	
			Total	1	
22			B ✓	1 (AO2.1)	
			Total	1	
23			B ✓	1 (AO2.1)	
			Total	1	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
24	a	i	**Any two from:** contains (plant) hormones ✓ causes excessive/rapid cell elongation/growth ✓ only affects broadleaved plants ✓	2 (AO2 x 1.1)	**ALLOW** auxins **IGNORE** just plants grow faster **ALLOW** effects some plants/weeds and not others/the crop
		ii	**B** because B causes highest percentage death of horsenettle ✓ A/C do not kill other broadleaved plants/weeds / A/C not suitable as field contains other weeds / A/C only kills horsenettle ✓ D does not kill roots / much less effective at killing horsenettle ✓ Spring treatment because buds just growing and flowering yet to happen ✓	4 (AO3.1b)	**No mark for B on its own.** **NEED a choice of B or D to score any marks** **Mark first choice** Need reference to both buds and flowering **ALLOW D** for three marks if B is not chosen first: because D kills more species of weeds ✓ D much cheaper than B ✓ spring treatment because buds just growing and flowering yet to happen ✓
	b	i	breaks seed dormancy / elongation of shoots ✓	1 (AO1.1)	**ALLOW** (stimulates) flowering/ fruit development / fruit growth / seed formation / germination / growth of shoots / seedless fruits **DO NOT ALLOW** fruit ripening / seed growth
		ii	Idea that the ripeness colour scale can be used for comparison ✓ idea that a numerical estimate/quantitative measure for level of ripeness is better / idea that it gives multiple measures and not just two/ripe or unripe / removes objectivity / allows reproducibility ✓	2 (AO2 x 3.3a)	**ALLOW** can be used to choose from a selection of ripeness levels

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
			Total	9	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK