AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.5.3.3

Hormones in human reproduction

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**4**
Available paper years	**2018–2022**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.5.3.3 Hormones in human reproduction

Answer 01 · Mark scheme

June 2018 | 8464/B/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1		an answer of 0.46 **or** 0.47 scores **2** marks		AO2 4.5.3.3
	$\frac{33}{72}$ **or** 0.45833…	allow $\frac{34}{72}$ **or** 0.47222…	1	
	0.46 (arbitrary units per hour)	allow 0.47 (arbitrary units per hour) allow an answer given to 2 significant figures from an incorrect calculation in step 1 for **1** mark	1	

4.5.3.3 Hormones in human reproduction

Answer 01 · Mark scheme

June 2018 | 8464/B/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	any **five** from: • (during the first days of the cycle) FSH from the pituitary stimulates an egg / follicle to mature • FSH stimulates oestrogen from the ovaries • oestrogen causes thickening of the uterus lining (in the first half of the cycle) • oestrogen inhibits FSH but stimulates LH from the pituitary • the high levels of LH stimulate release of the egg / ovulation (on day 14) • progesterone is secreted by the (empty) follicle / corpus luteum (after day 14 / ovulation) • progesterone maintains the lining of the uterus (during the second half of the cycle) **or** progesterone inhibits both FSH and LH • progesterone falls (if no pregnancy happens) and uterus lining comes away as the menstrual blood flow	points must be in correct order to gain full credit if no other marks awarded allow **1** mark for oestrogen and progesterone are produced by the ovaries and FSH and LH are produced by the pituitary	5	AO1 4.5.3.3

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Answer 01 · Mark scheme

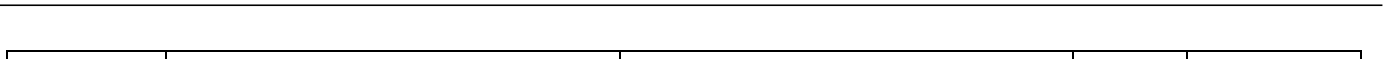
June 2018 | 8464/B/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	any **one** from: • (lower dose so) fewer side effects • (patch lasts longer so) don't have to remember to take pill every day • hormone (from patch) goes directly into bloodstream so (contraception) unaffected by vomiting		1	AO3 4.5.3.4
Total			**8**	

4.5.3.3 Hormones in human reproduction

Answer 01 · Mark scheme

June 2018 | 8464/B/2H | Original Q6



4.5.3.3 Hormones in human reproduction

Answer 02 · Mark scheme November 2020 | 8464/B/2H | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	four daughter cells are formed the parent cell divides twice		1 1	AO1 4.6.1.2
04.2	thyroid (gland) adrenal (gland) ovary / ovaries	in this order only	1 1 1	AO1 4.5.3.1
04.3	<table><tr><th>Hormone</th><th>Name of gland which releases hormone</th><th>Target organ of hormone</th></tr><tr><td>Luteinising hormone (LH)</td><td>Pituitary gland</td><td>Ovary</td></tr><tr><td>Adrenaline</td><td>Adrenal gland</td><td>Heart / lungs / liver</td></tr><tr><td>Glucagon</td><td>Pancreas</td><td>Liver / muscle</td></tr></table>		1 1 1	AO2 4.5.3.3 4.5.3.6 4.5.3.2
04.4	only need 1 parent plant will produce (many genetically) identical plants	allow for **1** mark it is a faster process allow for **1** mark will produce a large number of plants at one time ignore clones unqualified	1 1	AO3 4.6.1.1

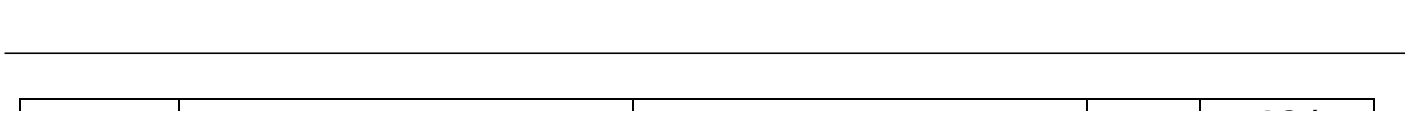
4.5.3.3 Hormones in human reproduction

04.5	any **two** from: • genetically identical so will all be susceptible to same diseases / pathogens • no genetic variety for new colours / characteristics to offer customers • no genetic variety leads to weaker / unhealthy plants (due to lack of evolution)		2	AO3 4.6.1.1 4.6.2.2
Total			**12**	

4.5.3.3 Hormones in human reproduction

Answer 02 · Mark scheme

November 2020 | 8464/B/2H | Original Q4



4.5.3.3 Hormones in human reproduction

Answer 03 · Mark scheme November 2021 | 8464/B/2H | Original Q1

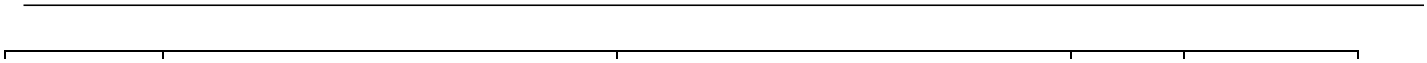
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	endocrine (system)	ignore hormonal (system)	1	AO1 4.5.3.1
01.2	D		1	AO1 4.5.3.1 4.5.3.2
01.3	A		1	AO1 4.5.3.1
01.4	(in / through / via) blood	allow (in / through / via) bloodstream allow (in / through / via) plasma allow (in / through / via) blood vessels **or** named blood vessel	1	AO1 4.5.3.1
01.5	ovary / ovaries testis / testes	in either order allow testicle(s) allow placenta if no other mark awarded allow gonad(s) for **1** mark	1 1	AO1 4.5.3.1 4.5.3.3
01.6	luteinising hormone (LH)		1	AO2 4.5.3.3

Question	Answers	Mark	AO / Spec. Ref.
01.7	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 4.5.3.4 4.3.1.9
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content Advantages • non-permanent like condom / diaphragm / IUDs / spermicides / abstinence **or** unlike surgical sterilisation • longer lasting than condom / diaphragm / IUDs / spermicides • no need to remember unlike oral contraceptive • one injection rather than surgery for sterilisation • surgery (for sterilisation) has risks, for example, infection • no other method of long-lasting contraception (rather than sterilisation) relies on men Disadvantages • no protection from sexually transmitted diseases unlike barrier methods **or** named barrier method • not as long lasting as (surgical) sterilisation • at clinical / drug trial stage, so unknown side effects • at clinical / drug trial stage, so unknown efficacy • do not know how long it will last (as info only states 'up to 13 years') • can stop taking a pill **or** using a condom if you change your mind / want to get pregnant, whereas have to wait 13 years with the injection • (minor) risk of infection posed with an injection compared to no risk with the oral contraceptive For **Level 3** references to advantages **and** disadvantages of the new drug compared to named existing methods are required.		
Total		**13**	

4.5.3.3 Hormones in human reproduction

Answer 03 · Mark scheme

November 2021 | 8464/B/2H | Original Q1



4.5.3.3 Hormones in human reproduction

Answer 04 · Mark scheme

June 2022 | 8464/B/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	negative feedback (control)	ignore homeostasis	1	AO2 4.5.3.6 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	A = glucagon B = insulin	both required in correct order correct or phonetic spelling only	1	AO2 4.5.3.2

4.5.3.3 Hormones in human reproduction

Answer 04 · Mark scheme

June 2022 | 8464/B/2H | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3 indirect marking view with 5.2	(when blood glucose concentration is high after a meal) insulin / B is secreted (by the pancreas) causing glucose to enter cells		1	AO2
	(glucose is) converted to glycogen in the liver / muscle (cells for storage)		1	AO1
	(this causes) blood glucose concentration to return to normal so insulin / B secretion slows / stops / decreases		1	AO2
	when blood glucose concentration is low glucagon / A is secreted (by the pancreas)		1	AO2
	(which causes) breakdown of glycogen in the liver (into glucose)	allow (which causes) breakdown of glycogen in the muscle (cells)	1	AO1
	(this causes) blood glucose concentration to return to normal so glucagon / A secretion slows / stops / decreases		1	AO2 4.5.3.2

4.5.3.3 Hormones in human reproduction

Answer 04 · Mark scheme

June 2022 | 8464/B/2H | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	FSH causes (several) ova / eggs to mature (in the ovary)	allow singular ovum / egg allow follicle for ovary	1	AO2 4.5.3.3 4.5.3.5
	(then) LH causes ovulation **or** LH causes release of the ova / eggs	allow singular ovum / egg	1	
	so more eggs / ova present therefore higher probability / chance of fertilisation **or** so more eggs / ova present therefore higher probability / chance of sperm fusing with an egg		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	collection of (mature) egg(s) from the ovary	allow follicle for ovary	1	AO1 4.5.3.5
	(which are) fertilised (in the laboratory)	do **not** accept if in fallopian tube allow egg and sperm fuse	1	
	develop into embryo(s) (in the laboratory)	allow develop / divide into small balls of cells (in the laboratory) do **not** accept foetus	1	
	embryo(s) inserted into uterus / womb		1	

4.5.3.3 Hormones in human reproduction

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	any **three** from: • meiosis forms sperm **and** mitosis forms liver (cells) • two cell divisions to form sperm **and** one cell division to form liver (cells) • four genetically different sperm cells **and** two genetically identical liver cells • sperm cells have 23 chromosomes **and** liver cells have 46 chromosomes	ignore reproduction max **2** marks if reference to sperm cells dividing allow four genetically different cells formed from meiosis **and** two genetically identical cells formed from mitosis allow sperm cells have 23 chromosomes **and** liver cells have 23 pairs of chromosomes allow haploid (sperm) and diploid (liver cells)	3	AO1 4.6.1.2 4.1.2.2

Total Question 5		**18**

Answer 01 · Examiner comments

June 2018 | 8464/B/2H | Original Q6

Question 6 (standard / high & high demand)

06.1 There were 16% correct responses to this question, achieved by reading correctly from the graph, followed by correct calculation and rounding.

However, a significant proportion of students misread the graph and so started with the wrong data. One mark was often achieved for giving their answer correct to two significant figures.

A large number of students did not to the rise in concentration of LH by time, although 'units per hour' was shown on the answer line. Many attempted to divide by days or minutes. Students also carried out the inverse calculation or tried to calculate percentage change.

06.2 10% of students gave excellent, clearly set out responses gaining four or five marks. These students demonstrated that they had understood and learnt the quite difficult interactions of hormones during the menstrual cycle. On the other hand, many students wrote confused accounts or simply describing the levels from the graph, so this question discriminated well.

A number of students referred to the pancreas as the site of production for some hormones while others did not gain because they referred to the 'master gland' rather than the pituitary. Some answers did not relate to the menstrual cycle. These students may have only read the second part of the question, name where each hormone is produced, for which they listed as many as they could, including testes and testosterone, pancreas and insulin, adrenalin and adrenal glands, thyroid and thyroxine.

The compensation mark was awarded in a number of cases, although there were many who gave the location of the hormones as the pancreas, or got all but one correct. 51% of students did not achieve any marks.

06.3 This question was not well answered with 'not having to remember to take the pill every day' being the most frequent correct response. There were many insufficient responses about it being more effective, longer lasting or being safer.

There was some confusion regarding how both patch and pill are used. Some students thought the patch was placed inside the vagina, in the mouth or on ovary. Others thought that it would reduce the risk of STDs, or that it is easy to remove if you want to get pregnant.

4.5.3.3 Hormones in human reproduction

Answer 03 · Examiner comments

November 2021 | 8464/B/2H | Original Q1

Question 1 (standard demand)

This question was about hormones and contraception. Early parts of the question involving recall of correct terms such as ‘endocrine’ were not well answered. Common incorrect answers were digestive system, respiratory system or attempts to name the organs. The vast majority of students knew that hormones travel in the blood. Some students knew the hormones were likely to be in the plasma, which was creditworthy. Inaccuracies in responses such as ‘in red blood cells’ did not gain the mark. Confusion was seen regarding the term ‘glands’ in **01.5** in this context, with a wide range of other parts of the reproductive system being named.

There was a generally a good attempt at evaluating a new contraceptive method with existing methods in **01.7**. In this extended response question students needed to consider both advantages and disadvantages compared with named existing methods of contraception to access 5 or 6 marks. Clear guidance relating to command words used in AQA GCSE Science examinations is available. Students were not given information regarding the efficacy of the new contraceptive, but some students attempted to compare the efficacy with existing contraceptive methods.

Answer 04 · Examiner comments

June 2022 | 8464/B/2H | Original Q5

Question 5 (standard, standard/high & high demand)

05.1 A quarter of students could identify this type of hormonal control as negative feedback. Common incorrect answers were homeostasis, diabetes and endocrine.

05.2 39% of students could interpret the figure to identify hormone A and hormone B as glucagon and insulin respectively. Both hormones were allowed to be spelt phonetically, however hybrid terms that indicated a possible confusion between glucagon and other terms such as glycogen, glucose and glycerol where not acceptable. Examples such as glycogen were seen.

Common mistakes were to confuse glucagon and insulin, or to name other hormones.

05.3 Explanations usually started with the first marking point but it was equally acceptable to start at the fourth marking point. The most frequently seen mark was for release of glucagon when blood glucose concentration is low.

Confusion was common between the terms glucagon and glycogen, plus glycerol was also regularly seen.

The third and sixth marking points were very challenging. These required an understanding of how negative feedback causes the reduction in the release of each hormone.

A fifth of students scored either three or four marks.

05.4 40% of students could identify the roles of FSH and LH. Few students gained the third marking point, to fully explain why the probability of pregnancy would be greater following FSH and LH injections.

05.5 Most students knew that IVF involves fertilisation in laboratory conditions. Some inaccuracies of language were seen, such as sperm and egg mix, with no reference to or description of fertilisation, and eggs being inserted into the body, with no reference to uterus or womb.

05.6 Students found this question challenging, with 4% achieving full marks. Confusion between meiosis and mitosis was common. Responses generally lacked the detail required for the points on the mark scheme. Some students only described one process or the other, rather than describing differences.

Responses could not gain full marks if there was an implication that sperm cells go through meiosis.

The third marking point was sometimes attempted, but not expressed clearly, such as four sperm cells are made that are different, but the two liver cells are the same. Reference to *genetically* different or *genetically* identical was required.