AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.4

Hormones in human reproduction

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**22**
Available paper years	**2007–2023**

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.

4.5.3.4 Hormones in human reproduction

Answer 01 · Mark scheme June 2007 | BLY1A | Original Q2 | Legacy

Two	**A**	FSH	**3**
	B	FSH and LH	**4**
	C	LH	**1**
	D	oestrogen	**2**

	A	**B**	**C**	**D**

Answer 02 · Mark scheme June 2007 | BLY1H | Original Q5 | Legacy

The full source mark scheme begins on page 19. Follow original question 5 in that document.

Answer 03 · Mark scheme November 2007 | BLY1A | Original Q6 | Legacy

Six	**3**	**3**	**1**	**1**

Answer 04 · Mark scheme March 2008 | BLY1AP | Original Q8 | Legacy

Eight	**3**	**4**	**1**	**4**

Answer 05 · Mark scheme June 2008 | BLY1AP | Original Q7 | Legacy

Seven	**1**	**1**	**1**	**4**

4.5.3.4 Hormones in human reproduction

Answer 06 · Mark scheme June 2008 | BLY1H | Original Q6 | Legacy

question	answers	extra information	mark
6(a)	any **four** from: • FSH stimulates eggs to mature • FSH stimulates oestrogen production • oestrogen stimulates LH production • oestrogen inhibits FSH production • allow oestrogen causes build-up of uterine / womb lining • LH stimulates egg release	maximum **3** marks if there is reference to only two hormones	4
6(b)	any **four** from: • cells used to treat diseases do not go on to produce a baby • produces identical cells for research • cells would not be rejected • allow cells can form different types of cells • (immature) egg contains only genetic information / DNA / genes / chromosomes from mother **or** there is only one parent • asexual / no mixing of genetic material / no sperm involved / no fertilisation **or** chemical causes development • baby is a clone • reference to ethical / moral / religious issues • risk of damage to the baby	allow ethically wrong **NB** cloning is illegal gains **2** marks ignore unnatural in correct context	4
Total			**8**

4.5.3.4 Hormones in human reproduction

Answer 06 · Mark scheme June 2008 | BLY1H | Original Q6 | Legacy

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

Answer 07 · Mark scheme November 2008 | BLY1AP | Original Q9 | Legacy

Nine	**4**	**4**	**2**	**2**

Answer 08 · Mark scheme June 2009 | BLY1AP | Original Q8 | Legacy

Eight	**3**	**4**	**1**	**1**

Answer 09 · Mark scheme November 2009 | BLY1AP | Original Q9 | Legacy

No matching mark scheme was available in the supplied archive for this question.

4.5.3.4 Hormones in human reproduction

Answer 10 · Mark scheme June 2010 | BLY1AP | Original Q1 | Legacy

Question	Key		
One	**A**	embryo	2
	B	ovary	1
	C	pituitary gland	3
	D	womb	4

Answer 11 · Mark scheme November 2010 | BLY1AP | Original Q8 | Legacy

Eight	**3**	**4**	**3**	**1**

Answer 12 · Mark scheme March 2011 | BLY1AP | Original Q1 | Legacy

Question	Key		
One	**A**	liver	**4**
	B	pituitary gland	**1**
	C	kidney	**3**
	D	skin	**2**

Answer 13 · Mark scheme March 2011 | BLY1AP | Original Q2 | Legacy

Two	**A**	result **A**	**4**
	B	result **B**	**2**
	C	result **C**	**1**
	D	result **D**	**3**

	A	**B**	**C**	**D**

4.5.3.4 Hormones in human reproduction

Answer 14 · Mark scheme

March 2011 | BLY1AP | Original Q9 | Legacy

Nine	**1**	**3**	**3**	**2**

Answer 15 · Mark scheme

June 2011 | BLY1AP | Original Q1 | Legacy

Question	Key		
One	**A**	kidney	4
	B	liver	1
	C	ovary	3
	D	pituitary gland	2

4.5.3.4 Hormones in human reproduction

Answer 16 · Mark scheme June 2011 | BLY1AP | Original Q9 | Legacy

Nine	**2**	**3**	**3**	**1**

The AQA UMS Conversion Calculator can be found at the following web address:

http://www.aqa.org.uk/umsconversion

4.5.3.4 Hormones in human reproduction

Answer 17 · Mark scheme

June 2011 | BLY1H | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	inhibit FSH production	ignore LH production ignore wrong hormone	1
	so egg does not mature	ignore egg production / egg release / egg development	1
8(b)	any **three** comparisons: eg • ease of insertion compared ie ring easily inserted by woman whereas implant needs professional **or** no damage to skin with ring	comparisons must be made ie two separate lists will gain no marks unless the lists are linked by eg whereas / however / on the other hand **and** the points are made in the same order in both lists	3
	• length of delivery compared eg 3 weeks for ring whereas 3 years for implant **or** delivery longer for implant **or** woman has to remember to insert ring whereas does not have to remember to insert implant	ignore cost	
	• effectiveness compared eg 0.3% failure with ring whereas nil for implant **or** implant more effective		
	• number giving up compared eg 4% for ring whereas 2% for implant **or** fewer women give up using implant **or** ring might cause vaginal discomfort whereas implant may cause irregular menstrual bleeding		
	reasoned conclusion (normally at the end)	ie must state 'better because....'	1
Total			**6**

The AQA UMS Conversion Calculator is available on the Results statistics page of the AQA Website.

4.5.3.4 Hormones in human reproduction

Answer 18 · Mark scheme

January 2012 | BL1HP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	any **one** from: • chemical messenger / message • chemical / substance produced by a gland • chemical / substance transported to / acting on a target organ • chemical / substance that controls body functions	allow substance / material which is a messenger allow material produced by a gland	1
4(a)(ii)	gland / named endocrine gland	brain alone is insufficient allow phonetic spelling	1
4(a)(iii)	in blood / plasma **or** circulatory system **or** bloodstream	accept blood vessels / named do **not** accept blood cells / named	1
4(b)	FSH stimulates oestrogen (production) / egg maturation / egg ripening oestrogen inhibits FSH LH stimulates egg / ovum release / ovulation	each hormone must be linked to correct action apply list principle ignore the gland producing hormone ignore production / development of egg allow oestrogen stimulates LH / build up of uterine lining accept LH inhibits oestrogen accept LH controls / stimulates growth of corpus luteum ignore production of egg	1 1 1
Total			**6**

4.5.3.4 Hormones in human reproduction

Answer 18 · Mark scheme

January 2012 | BL1HP | Original Q4 | Legacy

COMPONENT NUMBER: BL1HP

4.5.3.4 Hormones in human reproduction

Answer 19 · Mark scheme

January 2013 | BL1HP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	**A** – pituitary **B** – ovary / ovaries	allow hypothalamus	1 1
2(a)(ii)	in blood (stream)	accept in plasma ignore dissolved	1
2(b)(i)	FSH and Luteinising Hormone (LH)		1
2(b)(ii)	fertilised OR reference to sperm form embryos / ball of cells or cell division (embryo) inserted into mother's womb / uterus	 allow (fertilised egg) is inserted into mother's womb / uterus	1 1 1
2(b)(iii)	any **one** from: • multiple births lead to low birth weight • multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages	 allow premature ignore reference to cost / ethics / population	1
2(c)(i)	any **one** from: • almost identical • both approximately 20%	 allow S (slightly) more successful	1
2(c)(ii)	larger numbers (in clinic R) (in 2007) results likely to be more repeatable (in 2008)	allow only 98 (in S) (compared to 1004 (in R)) allow more reliable do **not** accept more reproducible / accurate / precise	1 1
Total			**11**

4.5.3.4 Hormones in human reproduction

Answer 19 · Mark scheme

January 2013 | BL1HP | Original Q2 | Legacy

BL1HP

4.5.3.4 Hormones in human reproduction

Answer 20 · Mark scheme

June 2015 | BL1HP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	any **two** from: • right amount of nutrients **or** different / all foods • right amount of energy • for (individual) needs	'right amount' only needed once for both marks to be awarded	2	AO1 1.1.1a
9(b)(i)	ovaries / ovary	allow placenta	1	AO1 1.2.2d
9(b)(ii)	any **one** from: • inhibits follicle stimulating hormone / FSH production • inhibits maturation of eggs	ignore ref to site of production of FSH allow stimulates LH production **or** stimulates preparation of womb lining	1	AO1 1.2.2d
9(b)(iii)	any **one** from: • stimulate muscle growth • used in (oral) contraceptives		1	AO1 1.3.1i / 1.2.2e
9(c)	small (rate of) decrease then bigger (rate of) decrease idea that change of rate (of decrease) at 900 (mg per day)	If no other mark awarded allow **1** mark for decrease	1 1	AO2 1.3
9(d)(i)	gene(s) / nucleus / chromosome(s) / DNA	allow ribosome	1	AO2 1.7.1a/b/c/d
9(d)(ii)	reduces production of cholesterol (by liver)	allow idea of switching off gene for reductase (production) allow switch off / reduce / inhibit reductase (production) allow reduces absorption of cholesterol (by intestine) allow statins (might) breakdown / destroy cholesterol	1	AO2 1.1.1d
Total			9	

4.5.3.4 Hormones in human reproduction

Answer 21 · Mark scheme November 2021 | 8461/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1		ignore examples		AO1 4.5.2.1
	response / reaction	ignore action	1	
	automatic **or** no thinking **or** not conscious **or** involuntary	ignore reference to brain ignore quick	1	
06.2	receptor (in skin of finger / hand) detects stimulus / temperature change	allow receptor detects heat ignore pain	1	AO1 4.5.2.1
	(electrical) impulses pass along neurones	allow electrical signals pass along nerve cells ignore messages	1	
	(impulses pass from) sensory to relay to motor neurones		1	
	synapse between neurones where chemical crosses gap	allow neurotransmitter / acetylcholine for chemical allow by diffusion	1	
	(synapses) in spinal cord / CNS	ignore brain	1	
	muscle contraction (to pull hand away) **or** effector is a muscle		1	
06.3	coordination by endocrine system is:	allow converse points if clearly indicating nervous co-ordination answers must be comparative		
	slower		1	AO1
	longer-lasting		1	AO1
	(chemical / hormone) via blood instead of electrical / impulse / neurones		1	AO2 4.5.2.1 4.5.3.1

4.5.3.4 Hormones in human reproduction

Answer 21 · Mark scheme

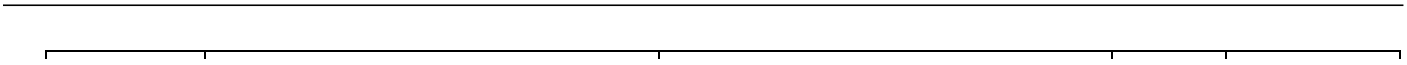
November 2021 | 8461/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4		ignore reference to days of menstrual cycle		
	FSH (release from pituitary) stimulates maturation of egg / ovum / follicle	allow FSH stimulates development / growth of egg	1	AO1 4.5.3.1 4.5.3.4
	oestrogen (release from ovary) inhibits FSH production **and** stimulates LH production		1	
	LH (release from pituitary) stimulates ovulation	allow LH stimulates release of egg	1	
	progesterone (release from ovary) inhibits FSH **and** LH production	allow (release from corpus luteum)	1	
	oestrogen **and** progesterone maintain the uterus lining	allow oestrogen **and** progesterone build up the uterus lining	1	
Total			**16**	

4.5.3.4 Hormones in human reproduction

Answer 21 · Mark scheme

November 2021 | 8461/2H | Original Q6



4.5.3.4 Hormones in human reproduction

Answer 22 · Mark scheme

June 2023 | 8461/2H | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	as volume of follicles rises oestrogen concentration (in blood) rises (for 7 / 8 days)	allow (positive) correlation between oestrogen concentration and volume of follicles (for 7 / 8 days) **or** oestrogen concentration is in proportion to follicle volume (for 7 / 8 days) do **not** accept an increase of oestrogen concentration causes an increase of follicle volume	1	AO3 4.5.3.4 4.5.3.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.2	(volume of one follicle) $= \frac{4}{3} \times 3.14 \times 11^3$	allow $= \frac{4}{3} \times \pi \times 11^3$	1	AO2
	= 5572.(4533)	allow 5575(.279…)	1	AO2
	(total volume of follicles) = 39 000 (mm^3)		1	AO3
	$\frac{39\,000}{5572} = 6.99…$	allow use of an incorrect volume (from Figure 12) and / or an incorrectly calculated volume of one follicle	1	AO2
	7	do **not** accept 7.0	1	AO2 4.5.3.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.3	(lack of FSH causes) lack of oestrogen (production)	allow lack of FSH causes lack of follicle development / growth / maturation	1	AO2 4.5.3.4
	breast development is dependent on oestrogen (from follicles)	allow (female) secondary sexual characteristics are dependent on oestrogen (from follicles)	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.4	gametes correct: **H + h and H + h**		1	AO2 4.6.1.6 4.6.1.7
	correct derivation of offspring genotypes: **HH Hh Hh hh**	allow correct for gametes stated in mp1	1	
	correct phenotype for each genotype	allow correct for genotypes stated in mp2 do **not** accept if no **hh** offspring	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5		allow annotated genetic diagram for all marks		AO3 4.6.1.6
	mother (has **hh** so) passes on **h**		1	
	father (has **Hh** so) passes on **H** or **h** with equal probability		1	
	(so) child will be **Hh** / hetero-zygous with 0.5 probability and produces FSH		1	

Total Question 7	14

Version 1.0: 0707

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Biology 4411

BLY1H Unit Biology 1

Mark Scheme

2007 examination - June series

4.5.3.4 Hormones in human reproduction

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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4.5.3.4 Hormones in human reproduction

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

4.5.3.4 Hormones in human reproduction

BLY1H Question 1

	answers	extra information	mark
(a)	scientists figures based on research / calculations / data **or** scientists sample whole area	ignore reasons based on bias	1
	fishermen based on impression / hearsay / experience **or** fishermen fish in well-stocked / limited areas	scientists sample a wider area = **2** marks fishermen only fish in well-stocked areas = **2** marks if no marks gained fishermens' opinion **and** scientists' opinion gains **1** mark	1
(b)	any **two** from: • economic considerations • political impact • pressure groups **or** fears of extinction	eg fear for jobs, profits, big demand for cod eg allow EU / government decide or laws will be passed	2
total			4

4.5.3.4 Hormones in human reproduction

BLY1H Question 2

	answers	extra information	mark
(a)	any **two** from: • area of bed sampled • sampling time • size of net • kicking action • net position	control variables from information given	2
(b)	any **two** from: • some animals not dislodged • some animals missed / through / escaped net • invertebrates difficult to identify • invertebrates from outside area	must be ideas related to a sample ignore reliability etc	2
(c)	10 to 99 **or** 10 – 99 **or** 99 to 10 **or** 99 – 10		1
(d)	any **two** from: • increased / goes up • 0 at sample 4 • to (more than) 100	allow increase implied from all data described	2
(e)	mayfly because not found downstream of point where sewage enters stream **or** only in the unpolluted water		1 1
total			9

4.5.3.4 Hormones in human reproduction

BLY1H Question 3

	answers	extra information	mark
	adaptation and <u>linked advantage</u> eg	max **2** for 3 adaptations	max 2 max 2
	• roots widespread / long (1) to collect water from large area (1)	ignore large roots accept to collect more water	
	• some roots deep / long (1) to collect water from deep down (1)	ignore large roots accept to collect more water	
	• absence of leaves (1) reduces water loss (1)		
	• swollen stem (1) to store water (1)		
	• roots near surface (1) to absorb rainwater (1)		
	• roots widespread (1) support in <u>sandy</u> soil (1)		
total			4

4.5.3.4 Hormones in human reproduction

BLY1H Question 4

	answers	extra information	mark
(a)(i)	viruses live inside cells		1
	viruses inaccessible to antibiotic	allow drug / antibiotic (if used) would (have to) kill cell	1
(ii)	mutation	ignore mutation caused by antibiotic	1
	natural selection **or** no longer recognised by antibiotics	accept description of natural selection	1
(b)	(stimulate) antibody production	ignore antitoxin	1
	(by) white cells		1
	<u>rapidly</u> produce antibody on re-infection	ignore antibodies remain in blood	1
total			7

4.5.3.4 Hormones in human reproduction

BLY1H Question 5

	answers	extra information	mark
(a)	ovary or ovaries		1
(b)	(hormone) implant		1
(c)	do not have to remember to take		1
(d)	does not involve hormone **or** it is a mechanical method	allow coil may be dislodged allow egg <u>is</u> fertilised / released allow not preventing egg fertilisation / release	1
(e)	involves death of fertilised egg **or** (regard) fertilised egg as human **or** stops fertilised egg developing	allow embryo / baby for fertilised egg ignore against religion only allow fertilised egg is alive ignore side effects	1
(f)(i)	inhibit FSH (production) so no eggs mature / develop / are produced	allow inhibits LH allow (LH) <u>stimulates</u> egg release ignore progesterone	1 1
(ii)	contains FSH which causes egg to mature / develop / be produced **or** in women whose FSH is low	allow contain LH allow (LH) <u>stimulates</u> egg release	1 1
total			9

4.5.3.4 Hormones in human reproduction

BLY1H Question 6

	answers	extra information	mark
(a)	asexual reproduction / mitosis **or** no fusion of gametes **or** division after fusion **or** from fertilised egg **or** from same embryo **or** from same egg **and** sperm	ignore cloning	1
	each embryo has identical genetic information / genes / DNA / chromosomes		1
(b)	any **two** from: • experimental subject and control are identical **or** fair test since monkeys identical • monkeys similar to humans, so effect of drugs likely to be similar • all identical so will have same reaction to drugs / disease • it's better than catching wild ones	allow closely related so… ignore evolved from	2
total			4

4.5.3.4 Hormones in human reproduction

BLY1H Question 7

	answers	extra information	mark
(a)	any **two** from: • balance between two important for good heart health • high LDL causes heart disease / high cholesterol • high HDL reduces heart disease / cholesterol	ignore blood pressure do **not** accept converse argument do **not** accept converse argument	2
(b)	heart attacks greater amongst patients with low HDL levels statins reduce heart attacks of patients **or** placebo is less effective	ignore statins cause heart disease ignore comparative effects of the two statins allow pravastatin is more effective supported by appropriate calculations eg pravastatin > 39 33% < 39 31.4% Average 32.4 > 39 32% < 39 28.2% Average 30.05%	1 1
total			4

4.5.3.4 Hormones in human reproduction

BLY1H Question 8

	answers	extra information	mark
(a)	present day organisms have evolved from simpler organisms	ignore answers in terms of natural selection	1
	over long periods of time **or** millions / billions of years		1
(b)	(natural selection operates on successful) characteristics produced by chance / (random) mutation		1
	in this experiment caused by hormones / environment	allow this example indicates inheritance of acquired characteristics for **2** marks allow this is Lamarckism only for **1** mark	1
total			4

4.5.3.4 Hormones in human reproduction

Answer 21 · Examiner comments — November 2021 | 8461/2H | Original Q6

Question 6 (standard, standard/high & high demand)

This question was about coordination by the nervous and endocrine systems. Most students were able to state that a reflex action was either a response (reaction) or that it was automatic with around one-third providing both points.

06.2 was worth 6 marks for describing how a person's nervous system would coordinate the withdrawal of a hand from a hot object by reflex action. A few students scored full marks and just under a half scored half-marks or more. Common errors included misnaming the neurones involved, using the term 'messages' instead of impulses, thinking that this reflex involved the brain, and referring to the spinal cord as the 'spine'. Omissions included the mechanism of synaptic transmission via a chemical crossing the gap and the location of the synapses in the spinal cord.

In **06.3**, very few students were able to give three differences between coordination by the endocrine and nervous systems, although just under half could give at least one. The most common correct answers were that endocrine coordination was generally slower and longer-lasting than nervous coordination. While many students alluded to a chemical, or hormone being involved in endocrine action, few explained that this was transmitted via the blood rather than along neurones. Some answers were inadequate as they were not comparative, eg hormonal coordination is not just 'slow' but slower than nervous coordination.

Answer 22 · Examiner comments — June 2023 | 8461/2H | Original Q7

Question 7

This question was about an inherited condition resulting in underproduction of the hormone FSH in one woman.

07.1 Given the graph in Figure 12 which showed changes in the concentrations of FSH and oestrogen in the woman's blood and in the number of follicles in her ovaries following 7 days of FSH injections, students had to look for evidence that the follicles were the source of oestrogen. A little over one-third appreciated the correlation between the rising follicle volume and oestrogen concentration lines on the graph. Many related the oestrogen production just to the increase in FSH.

07.2 This question was a 5-mark calculation of the number of follicles present in the woman's ovaries on the 11th day after the start of FSH injections. The question gave the mean diameter of a follicle as 22 mm and Figure 12 showed that, on the 11th day, the total volume of the follicles was 39 000 mm^3.

Despite being given the formula for the volume of a follicle, a considerable number of students squared rather than cubing the radius. Some used the diameter in the calculation instead of the radius. Either of these mistakes prevented them from being awarded the first 2 marks which were for calculating the volume of one follicle, but it was still possible to gain the remaining points. Many students used the 'π' button on their calculator rather than the

Answer 22 · Examiner comments

figure of 3.14 which was given to them but this was accepted within the mark scheme. Many students calculated the volume of one follicle but got no further.
Readings of the total volume of follicles from the graph were often accurate enough to be rewarded but some students read from the incorrect y-axis, from the wrong place on the volume curve or from the FSH curve.

Wrong figures for follicle volumes could be used in the final steps of the calculation as long as the answer given was correct for the figures used. Many students were able to access the last two marking points for dividing their misread total volume by their miscalculated volume of one follicle and then rounding to a whole number, as instructed in the question. Just under half the students scored full marks in this calculation.

07.3 Here students were required to explain the link between lack of FSH in the woman's blood and the lack of breast development. Some students suggested a direct link but better ones knew that FSH would normally have stimulated oestrogen secretion and that the latter was the cause of breast development.

07.4 Given that the woman had inherited a faulty gene for FSH production from each of her parents, and that each parent was able to produce FSH, most students could work out that each parent was heterozygous and were therefore able to construct an appropriate Punnett square diagram to show these parents could have a child who could not produce FSH. Despite the instruction to 'identify the phenotype of each offspring genotype', many simply omitted this or gave inadequate identifications – eg just the woman's phenotype, or describing the different genotypes as being homozygous, heterozygous or carriers, none of which is a phenotype.

07.5 The most successful answers, without any prompting in the question, included another Punnett square to show that the probability of the homozygous recessive woman and the heterozygous man producing a child able to produce FSH was 0.5. This necessitated identifying the woman's gametes as all having the recessive allele while half of the man's gametes would have the recessive and half the dominant allele, and identifying that half the potential offspring would be heterozygous and hence able to make FSH. Almost half the students made some headway with this, but only 1 in 6 gained full marks.