AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.6

The use of hormones to treat infertility (HT only)

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**20**
Available paper years	**2007–2024**

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.

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 01 · Mark scheme January 2007 | BLY1H | Original Q7 | Legacy

Question 7

	answers	extra information	mark
(a)	have identical genes / chromosomes / genetic material		1
	since asexual reproduction	accept mitosis	1
(b)	mixture of genes / chromosomes / genetic material from two parents	accept meiosis	1
	sexual reproduction / fusion of gametes		1
(c)	public misunderstand technique as cloning **or** worried about large numbers of clones **or** moral / ethical / religious issues **or** unnatural process **or** scientists must not play god **or** technique may lead to embryo death	do **not** allow mark for embryos lost	1
total			5

Answer 02 · 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 03 · Mark scheme March 2008 | BLY1AP | Original Q8 | Legacy

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

Answer 04 · Mark scheme June 2008 | BLY1AP | Original Q7 | Legacy

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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 05 · Mark scheme

November 2008 | BLY1AP | Original Q9 | Legacy

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

Answer 06 · Mark scheme

March 2009 | BLY1AP | Original Q9 | Legacy

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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 07 · Mark scheme

June 2009 | BLY1H | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	any **three** from • FSH <u>used / given / injected</u> • LH <u>used / given / injected</u> • FSH causes eggs to mature • LH stimulates egg release	if oestrogen **or** progesterone <u>used</u> = max 2 if both oestrogen **and** progesterone <u>used</u> = max 1 ignore <u>effects</u> of oestrogen and progesterone	3

Question 7 continues on next page…

4.5.3.6 The use of hormones to treat infertility (HT only)

BLY1H

Question 7 Continued

question	answers	extra information	mark
7(b)	max **two** pros for IVM / it from: • cheaper • less hormones used • ovarian hyperstimulation **or** the syndrome less likely • IVM treatment shorter	allow max **two** cons for IVF allow 'it's safer for the mother' ignore 'more risks' unqualified	2
	con for IVM • small risk of abnormal sex chromosomes / birth defects / baby cancer	allow max **one** pro for IVF allow 'more risk to baby' ignore 'more risks' unqualified	1
	evaluation eg IVM better because less risk to mother outweighs small risk to baby **or** IVF better because no risk to baby and a small risk to mother	must include an appreciation that there are two sides to the argument	1
Total			**7**

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 08 · Mark scheme

November 2009 | BLY1AP | Original Q9 | Legacy

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

Answer 09 · Mark scheme

March 2010 | BLY1AP | Original Q7 | Legacy

Seven	**2**	**1**	**4**	**3**

Answer 10 · Mark scheme

June 2010 | BLY1AP | Original Q9 | Legacy

Nine	**3**	**2**	**3**	**4**

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 11 · Mark scheme January 2011 | BLY1H | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	FSH / follicle stimulating hormone LH / luteinizing hormone	allow FHS either order	1 1
3(b)	any **four** from: • egg(s) collected from ovary • *(eggs)* mixed with sperm **or** fertilisation occurs • fertilised egg divides • embryo formed • *(*embryos*)* inserted into womb / uterus • FSH matures egg **and** LH releases eggs	 allow eggs and sperm put into tube ignore references to vagina	4
Total			**6**

BLY1H

Answer 12 · Mark scheme March 2011 | BLY1AP | Original Q9 | Legacy

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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 13 · Mark scheme

November 2011 | BLY1AP | Original Q7 | Legacy

Seven	**1**	**3**	**2**	**3**

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 14 · 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**

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 14 · Mark scheme January 2013 | BL1HP | Original Q2 | Legacy

BL1HP

Answer 15 · Mark scheme June 2014 | BL2HP | Original Q6 | Legacy

6(a)(i)	one form of a / one gene	do **not** allow 'a type of gene' allow a mutation of a gene	1	AO1 2.7.2c,e , 2.7.3a
6(a)(ii)	not expressed if dominant / other allele is present / if heterozygous **or** only expressed if dominant allele not present / or no other allele present	allow need two copies to be expressed / not expressed if only one copy / only expressed if homozygous	1	AO1 2.7.2c,e , 2.7.3a
6(b)(i)	two parents without PKU produce a child with PKU / **6** and **7** → **10**	allow 'it skips a generation'	1	AO3 2.7, 2.7.3a
6(b)(ii)	genetic diagram including: Parental gametes: 6: **N** and **n** **and** 7: **N** and **n** derivation of offspring genotypes: **NN Nn Nn nn** identification: **NN** and **Nn** as non-PKU **OR nn** as PKU correct probability only: 0.25 / ¼ / 1 in 4 / 25% / 1 : 3	accept alternative symbols if defined allow genotypes correctly derived from student's parental gametes allow correct identification of student's offspring genotypes do **not** allow 3 : 1 / 1 : 4 do **not** allow if extra incorrect probabilities given	1 1 1 1	AO2 / AO3 2.7, 2.7.3a
6(c)(i)	mitosis	correct spelling only	1	AO1 2.7.1a,c ,d
6(c)(ii)	8		1	AO2 2.7.1c,i, 2.7.3a, 2.7.3d
6(c)(iii)	DNA	allow deoxyribonucleic acid do **not** allow RNA / ribonucleic acid	1	AO1 2.7.2g, 2.7.3a, 2.7.3d

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 15 · Mark scheme

Question	Answers	Extra information	Mark	AO / spec ref.
6(d)(i)	may lead to damage to embryo / may destroy embryos / embryo cannot give consent	allow avoid abortion allow emotive terms – eg murder religious argument must be qualified allow ref to miscarriage allow idea of avoiding prejudice against disabled people allow idea of not producing designer babies	1	AO3 2.7, 2.7.3a
6(d)(ii)	any **one** from: • prevent having child with the disorder / prevent future suffering / reduce incidence of the disease • embryo cells could be used in stem cell treatment	ignore ref to having a healthy child ignore ref to selection of gender allow ref to long term cost of treating a child (with a disorder) allow ref to time for parents to become prepared	1	AO3 2.7, 2.7.3a
Total			**12**	

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 15 · Mark scheme

June 2014 | BL2HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 16 · Mark scheme June 2016 | BL2HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	testis / testes	allow testicle(s)	1	AO1 2.7.1f
5(b)(i)	**B** = 13.2 **C** = 6.6 **E** = 3.3	all 3 correct = 2 marks 2 or 1 correct = 1 mark If no marks awarded allow ecf for C **and** E based on answer to B ie C = ½ B **and** E = ½ C for one mark	2	AO2 2.7.1e/h
5(b)(ii)	6.6	allow twice answer for cell **E** in 5bi	1	AO2 2.7.1e/h/i
5(b)(iii)	mitosis	correct spelling only	1	AO1 2.7.1a/d/i
5(c)(i)	any **two** from: • cells that are able to divide • undifferentiated cells / not specialised • can become other types of cells / tissues **or** become specialised /differentiated	allow pluripotent	2	AO1 2.7.1k/l
5(c)(ii)	4-day embryo is a (potential) human life **or** destroying/damaging (potential) human life	allow cord would have been discarded anyway ignore reference to miscarriage allow cannot give consent	1	AO3 2.7
5(c)(iii)	perfect tissue match **or** hard to find suitable donors	allow same/matching antigens allow no danger of rejection allow no need to take immunosuppressant drugs (for life) ignore genetically identical **or** same DNA	1	AO2 2.7.1c

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 16 · Mark scheme

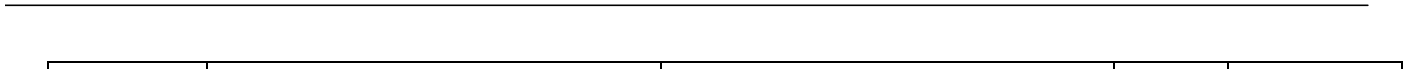
June 2016 | BL2HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(c)(iv)	stem cells have same faulty gene / allele / DNA / chromosomes	allow genetically identical ignore cells have the same genetic disorder	1	AO2 2.7.1c
Total			**10**	

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 16 · Mark scheme

June 2016 | BL2HP | Original Q5 | Legacy



4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 17 · Mark scheme June 2017 | BL2HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	46 **or** 23 pairs		1	AO1 2.7.2b
6(a)(ii)	(alternative / different) form(s) of a gene / of the same gene		1	AO1 2.7.2c
6(a)(iii)	only expressed if the dominant (allele) is not present / if the other (allele) is not present **or** only expressed if 2 (recessive alleles) are present	allow won't be expressed if the dominant allele is present	1	AO1 2.7.2e
6(b)(i)	having 2 different alleles	do **not** allow 2 different genes ignore carrier	1	AO1 2.7
6(b)(ii)	genetic diagram including: correct gametes **or** parental genotypes **N** and **n** and **N** and **n** **or** **Nn** and **Nn** offspring genotypes correctly derived: **NN** **Nn** **Nn** **nn** identification of **nn** as AKU correct probability only: 0.25 / ¼ / 1 in 4 / 25% / 1 : 3	allow alternative symbols if defined do **not** allow if alternative symbols used and not defined allow genotypes correct for student's parental gametes allow correct identification of student's offspring genotypes do **not** allow 3 : 1 / 1 : 4 do **not** allow if extra incorrect probabilities given	1 1 1 1	AO2/3 2.7 2.7.3a

4.5.3.6 The use of hormones to treat infertility (HT only)

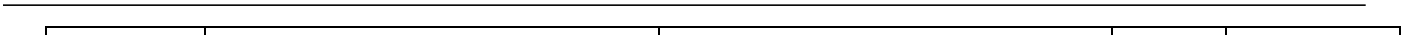
Answer 17 · Mark scheme June 2017 | BL2HP | Original Q6 | Legacy

6(c)(i)	mitosis	correct spelling only	1	AO1 2.7.1a/d
6(c)(ii)	4		1	AO2 2.7.1a,d
6(d)(i)	any **one** from: • may lead to damage to embryo **or** may destroy embryos • embryo cannot give consent • ref to possible miscarriage (of implanted embryo) • idea of avoiding prejudice against disabled people • idea of not producing designer babies	allow emotive terms e.g. murder allow disposal of embryos allow embryos used in research ignore religion unqualified	1	AO3 2.7 2.7.3d
6(d)(ii)	any **one** from: • prevent having child with the disorder **or** reduce incidence of the disease / inherited / genetic diseases **or** prevent future suffering of child from the disease • embryo cells could be used in stem cell treatment • can have another child without need for IVF • provides embryos for research • ref to avoiding long term cost of treating a child (with a disorder) **or** avoid parental stress	ignore ref to having a healthy child ignore ref to selection of gender allow reference to parents being prepared in advance	1	AO3 2.7 2.7.3d
Total			**12**	

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 17 · Mark scheme

June 2017 | BL2HP | Original Q6 | Legacy



4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 18 · Mark scheme

June 2018 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	3.7		1	AO2 4.7.2.1
08.2	2		1	AO1 4.6.1.6
08.3	(different combinations of alleles cause) many / 22 values **or** in-between values **or** large range of values **or** there are not only two values	allow continuous variation allow there are not only 3 values if 3 is given in question **08.2**	1	AO3 4.6.1.6 4.6.2.1
08.4	different protein made active site changed so substrate does not fit / bind	allow change in shape (of enzyme) or change in 3-D structure ignore denature allow description of substrate allow cannot form E-S complex ignore lock and key description	1 1 1	AO1 4.2.2.1 4.6.1.5
08.5	produces (some) offspring with high-fat milk **or** not all offspring have low-fat milk	ignore reference to alleles	1	AO3 4.6.1.6
08.6	takes less time (to obtain results) **or** more offspring at the same time	allow other sensible suggestion – eg allows screening **or** allow cow 7 to continue to produce eggs **or** avoid injury to cow 7 during mating or giving birth	1	AO3 4.5.3.6

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 18 · Mark scheme

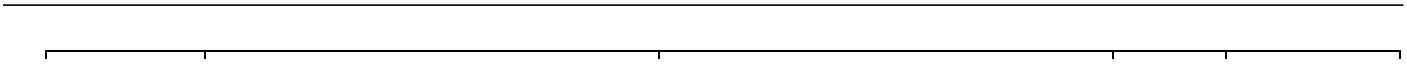
June 2018 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.7		**max 3** marks if own symbols used with no key **max 3** marks if alternative diagram to Punnett square used		AO2 4.6.1.6
	male gametes correct: d (and d)		1	
	female gametes correct: D and d	allow **1** mark if gametes are correct but gender not identified	1	
	correct derivation of offspring genotypes from given gametes	allow 2 × 2 **or** 2 × 1 derivation	1	
	Dd identified as low-fat **and** dd identified as high-fat in offspring	if DD offspring are produced, must also identify as low-fat	1	
08.8	find female with low(est) fat in milk **and** high(est) milk yield	allow choose from 7, 9, 12, 13 which has the highest yield	1	AO3 4.6.2.3
	find male whose female offspring have high(est) milk yield **and** low(est) fat in milk **or**	allow choose from 16 or 18 whose female offspring has the highest yield	1	AO3 4.6.2.3
	find female with lowest fat in milk **or** cow 13 (1) **or** find male whose female offspring have high(est) milk yield (1)	allow female with high(est) milk yield allow male whose female offspring have lowest fat in milk / male 16		
	cross the best (for both features) female with the best male		1	AO2 4.6.2.3
	select best offspring (for both features) from each generation and repeat for several generations		1	AO2 4.6.2.3
Total			**16**	

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 18 · Mark scheme

June 2018 | 8461/2H | Original Q8



4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 19 · 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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 19 · Mark scheme

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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 20 · Mark scheme

June 2024 | 8461/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	any **two** from: • same starting position of rule(r) • more precise scale • repeat **and** calculate mean **or** repeat **and** eliminate anomalies • convert distance to time • student (**B**) rests hand / arm on table	allow ensure the starting position of rule(r) is at 0cm allow other control variables allow two control variables for **2** marks allow rule(r) with mm scale ignore more accurate scale	2	AO3 4.5.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	any **two** from: *endocrine system:* • (hormones) via blood • chemical transmission • slower • longer-lasting	allow converse if clearly referring to nervous system allow not via neurones / cells allow not (electrical) impulses allow not electrical signals ignore messages ignore hormones answers must be comparative ignore reference to target organs	2	AO1 4.5.2.1 4.5.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	thyroxine	do **not** accept thyroxide ignore reference to TSH / TRH	1	AO1 4.5.3.1 4.5.3.7

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 20 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	any **one** from: • insulin • glucagon		1	AO1 4.5.3.1 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	any **two** from: • increases heart rate • increases breathing rate • increases oxygen delivery to cells / tissues / organs • increases glucose delivery to cells / tissues / organs • increases respiration / metabolism • increases sweat(ing)	allow increases blood flow allow examples of cells / tissues / organs allow increases energy release do **not** accept energy produced / made / created allow dilation of pupils allow vasoconstriction in skin **or** vasoconstriction in digestive system allow raises blood sugar / glucose level **or** increase conversion of glycogen to glucose allow vasodilation in (skeletal) muscles **/** brain allow increased blood pressure allow slows digestion allow other correct effects of adrenaline if no other marks awarded allow **1** mark for prepares for 'fight or flight'	2	AO1 4.5.3.7

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 20 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
05.6	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.5.3.4 4.5.3.5 4.5.3.6
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content **contraception:** • use of hormones oestrogen and progesterone **or** progesterone (only) o inhibition of FSH (production / release) - lack of FSH prevents follicle / egg development / maturation - therefore there is no egg to fertilise o inhibition of LH (production / release) - lack of LH prevents ovulation - therefore there is no egg to fertilise • contraceptive methods include oral contraceptive pill, injection, implant, skin patch, IUD / IUS with hormones **treatment of infertility:** • use of FSH o (FSH) stimulates **maturation** of (several) egg(s) / follicle(s) - (FSH) increases number of eggs matured • use of LH o (LH) stimulates ovulation - (LH) allows eggs / follicles to be collected (from ovary) - (so) increased chance of fertilising an egg - IVF and insertion of embryo(s) into uterus • use of progesterone o (to) maintain uterus lining - increased chance of implantation For **Level 3**, details of both contraception and infertility treatment are required.		

Total Question 5	14

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 19 · 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

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 19 · 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.

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 20 · Examiner comments June 2024 | 8461/2H | Original Q5

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

05.1 Almost 30% of students were able to suggest two ways to improve the student's method for measuring human reaction time, with a further 45% gaining one mark. Some students suggested extensions to the method rather than improvements, such as testing with caffeine or using a computer programme - which did not answer the question. A number of students gave vague responses such as 'repeat it' or 'put the ruler closer to the hand' which were insufficient for credit at this level.

05.2 Students were asked to give two ways that coordination by the endocrine system is different from coordination by the nervous system. The full range of available marking points were seen for this question, with over half of students gaining full marks. Most comparisons involved 'slower', 'longer lasting' or reference to 'electrical impulses' in the nervous system. The better answers included multiple comparisons in the same sentence ie 'endocrine is slower but longer lasting' and 'nervous involves electrical impulses carried along neurones whereas endocrine is chemicals carried in the blood.'

© 2024 AQA and its licensors. All rights reserved.

4.5.3.6 The use of hormones to treat infertility (HT only)

Answer 20 · Examiner comments June 2024 | 8461/2H | Original Q5

05.3 Over 80% of students correctly identified thyroxine as the hormone produced by gland A. Common errors included naming the gland (thyroid) rather than the hormone, or naming hormones released from the pituitary gland such as FSH, LH or ADH.

05.4 Around 80% of students were able to name one hormone produced by gland B, with insulin being the most popular response. Common incorrect responses named hormones involved in the menstrual cycle. There were mostly good spellings for 'glucagon' which has not been the case in previous years.

05.5 Almost 55% of students could describe two effects of adrenaline on the human body, the most common of which were increased heart rate and increased breathing rate. Some answers lacked detail such as 'increased awareness' or 'they have more energy' which are insufficient for credit at this level. A significant number of students gave the fall-back mark relating to preparing the body for the flight or fight response, which was only credited if no other correct responses had been given.

05.6 This was an extended response question with three levels, the highest of which was set at high demand. Students were asked to explain the use of hormones in both contraception and the treatment of infertility. Less than 10% of students were able to access Level 3, commonly due poor articulation or use of vague scientific terminology. Those that did however, showed very clear links between the correct hormones, their roles in contraception/infertility treatment and the associated consequences of using them.

Around 45% of students obtained marks in Level 2, after correctly explaining the use of at least one hormone for both contraception and infertility. Students that did not include an explanation for both contraception and the treatment of infertility were restricted to Level 1. Students are reminded to read the question carefully and ensure all parts are answered to the same standard. It was noticeable that many students spent more time explaining the roles of hormones in contraception, and then went on to possibly rush their explanation for infertility.

Regarding contraception, many students could refer to progesterone and/or oestrogen, and the subsequent inhibition of FSH and LH, but then did not specifically indicate which hormone undertook which function, and so failed to link to a consequence for either hormone. The general consequence of 'no eggs to fertilise' was regularly seen in place of these.

Regarding infertility, the same pattern was seen, so very few consequential links were credited. However, many students described the process of IVF and insertion of the embryo into the uterus, to gain credit for a general consequence.

The use of progesterone to maintain the uterus lining was often muddled with contraception, and the idea of increased *chance* of implantation, or increased *chance* of fertilising an egg for the use of LH was rarely seen.

© 2024 AQA and its licensors. All rights reserved.