AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.1.8

Sex determination

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**8**
Available paper years	**2009–2025**

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.

4.6.1.8 Sex determination

Answer 01 · Mark scheme

January 2009 | BLY2F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)	2 and 3		1
3(b)	cell **P** has an X chromosome; cell **R** has a Y chromosome		1
3(c)	any **two** from: • (formed from) different egg / 2 eggs • (formed from) different sperm / 2 sperm • have different genes / alleles / chromosomes / DNA	 allow genetics	2
3(d)(i)	stem cells		1
3(d)(ii)	the cells divide the cells differentiate		1 1
3(d)(iii)	(medical) research / named eg growing organs **or** medical / patient treatment	allow (embryo) cloning do **not** allow designer babies / more babies	1

Question 3 continued on next page…

4.6.1.8 Sex determination

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Question 3 continued…

question	answers	extra information	mark
3(d)(iv)	any **one** from: • ethical / moral / religious objections • potential harm to embryo	ignore cruel / not natural / playing God allow deformed ignore harm to mother	1
Total			**9**

4.6.1.8 Sex determination

Answer 01 · Mark scheme

January 2009 | BLY2F | Original Q3 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

4.6.1.8 Sex determination

Answer 02 · Mark scheme January 2011 | BLY2F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	any **one** from: • A • C		1
4(a)(ii)	any **one** from: • B • D		1
4(b)(i)	pig A		1
4(b)(ii)	a gamete		1
4(c)	XY **or** YX X Y XY **or** YX	 in this order only 	1 1 1
Total			**7**

4.6.1.8 Sex determination

Answer 02 · Mark scheme

January 2011 | BLY2F | Original Q4 | Legacy

BLY2F

4.6.1.8 Sex determination

Answer 03 · Mark scheme

June 2012 | BL2FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	23		1
4(a)(ii)	nucleus / 'the head'	allow phonetic spelling	1
4(b)(i)	**X** and **X**		1
4(b)(ii)	**X** and **Y**		1
4(c)	150 million / 150,000,000 / half (of them) / 50% / 1in 2		1
Total			**5**

4.6.1.8 Sex determination

Answer 03 · Mark scheme

June 2012 | BL2FP | Original Q4 | Legacy

BL2FP

4.6.1.8 Sex determination

Answer 04 · Mark scheme

January 2013 | BL2FP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	DNA		1
2(b)	X and Y		1
2(c)(i)	46 chromosomes		1
2(c)(ii)	half the number		1
2(d)	meiosis		1
Total			5

4.6.1.8 Sex determination

Answer 04 · Mark scheme

January 2013 | BL2FP | Original Q2 | Legacy

BL2FP

4.6.1.8 Sex determination

Answer 05 · Mark scheme

June 2013 | BL2FP | Original Q3 | Legacy

Question 3

<table>
<tr><th>question</th><th>answers</th><th>extra information</th><th>mark</th></tr>
<tr><td>3(a)(i)</td><td>
<table>
<tr><th>Feature</th><th>Mitosis only</th><th>Meiosis only</th></tr>
<tr><td>Produces new cells during growth and repair</td><td>✓</td><td></td></tr>
<tr><td>Produces gametes (sex cells)</td><td></td><td>✓</td></tr>
<tr><td>Produces genetically identical cells</td><td>✓</td><td></td></tr>
</table>
All 3 correct = 2 marks
2 correct = 1 mark
0 or 1 correct = 0 marks
</td><td></td><td>2</td></tr>
<tr><td>3(a)(ii)</td><td>(a man) testis / testes
(a woman) ovary / ovaries</td><td>accept testicle(s)
do not accept ‘ova’ / ovule</td><td>1
1</td></tr>
<tr><td>3(b)(i)</td><td>XY / YX
or
X and Y</td><td></td><td>1</td></tr>
<tr><td>3(b)(ii)</td><td>XX
or
X and X or 2 X’s</td><td>accept X</td><td>1</td></tr>
<tr><td>3(c)</td><td>½ / 0.5 / 50% / 1:1 / 1 in 2</td><td>do not accept 1:2 / 50/50
allow 50:50
allow 2 in 4</td><td>1</td></tr>
<tr><td>Total</td><td></td><td></td><td>7</td></tr>
</table>

4.6.1.8 Sex determination

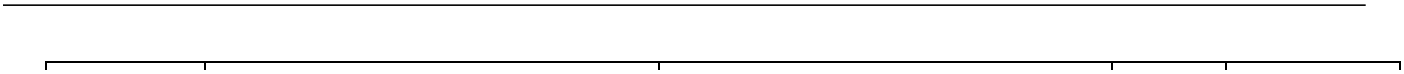
Answer 06 · Mark scheme June 2015 | BL2FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	(female) has XX / only X's / no Y	allow has X chromosomes ignore ref to genes / cells	1	AO2 2.7.2b, 2.7.3a
5(a)(ii)	extra chromosome / has 47 chromosomes / one set has 3 copies no. 18	ignore reference to chromosome numbers other than 47 or no. 18	1 1	AO2 2.7.1a,e, 2.7.3a
5(b)(i)	14	allow in range of 13.5 to 14.5	1	AO2 2.7.1a,e, 2.7.3a
5(b)(ii)	7	allow in range of 6.75 to 7.25 accept ecf from 5bi	1	AO2 2.7.1a,e, 2.7.3a
5(c)	Advantages: any **two** from: • more than 1 embryo (so more chance of success) • tested at 3 days cf 10 weeks **or** tested earlier • tested before pregnancy • no termination / abortion • spare embryos have a potential use Disadvantages: any **one** from: • needs an operation • (spare) embryos / human life destroyed / harmed • higher cost • embryos might not implant / might not develop	allow method 2 may cause a miscarriage tested when only 3 days old accept described hazard of operation must be comparative	2 1	AO3 2.7, 2.7.3d
Total			**8**	

4.6.1.8 Sex determination

Answer 06 · Mark scheme

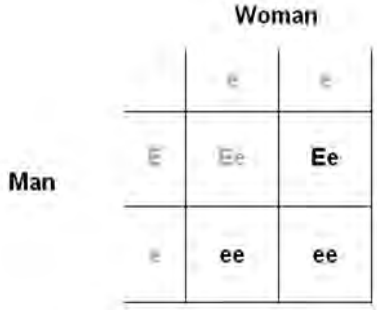
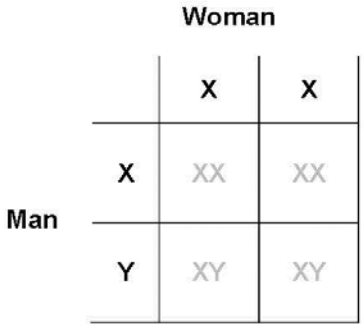
June 2015 | BL2FP | Original Q5 | Legacy



4.6.1.8 Sex determination

Answer 07 · Mark scheme

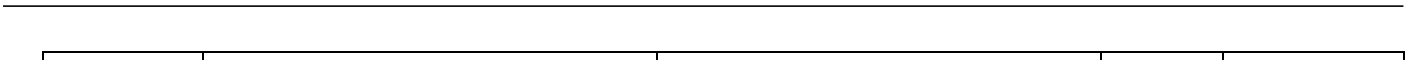
June 2019 | 8461/2F | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	an allele expressed even if a person only has one copy of the allele		1	AO1 4.6.1.6
02.2		all 3 correct= 2 marks 1 or 2 correct = 1 mark	2	AO2 4.6.1.6
02.3	correct probability from Figure **4**	if no answer in Question **02.2** allow 0.5	1	AO3 4.6.1.6
02.4		gametes = X + X **and** X + Y allow in incorrect positions X, X, X and Y in correct boxes	1 1	AO2 4.6.1.6 4.6.1.8
02.5	 answer from Question **02.3** × 0.5 answer to calculation in mp1	an answer matching the answer from Question **02.3** × 0.5 scores **2** marks if no answer in Question **02.3**, an answer of 0.25 / ¼ / 1 in 4 / 25% scores **2** marks if no answer in Question **02.3** allow 0.5 × 0.5 if no answer in Question **02.3** allow 0.25 / ¼ / 1 in 4 / 25%	 1 1	AO2 4.6.1.6 4.6.1.8
Total			**8**	

4.6.1.8 Sex determination

Answer 07 · Mark scheme

June 2019 | 8461/2F | Original Q2



4.6.1.8 Sex determination

Answer 08 · Mark scheme

June 2025 | 8461/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	an allele expressed when a rabbit has only one copy of the allele		1	AO1 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	**hh**		1	AO2 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	<table><tr><td></td><td>**H**</td><td>**h**</td></tr><tr><td>**H**</td><td>HH</td><td>Hh</td></tr><tr><td>**h**</td><td>Hh</td><td>hh</td></tr></table> male gametes correct all three offspring genotypes correctly derived from gametes	 allow **1** mark for 2 correct	 1 2	AO2 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	(on **Figure 2**) ring drawn around **HH** and / or **hh**		1	AO2 4.6.1.6

4.6.1.8 Sex determination

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	3	answer must be consistent with genotypes in question **01.3** if given allow 3 if question **01.3** is not answered	1	AO3 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	1		1	AO1 4.6.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	2 / two	allow half / ½ (of them) ignore ratios	1	AO2 4.6.1.8

Total Question 1	**9**

Answer 08 · Examiner comments

Question 1 (Low demand)

01.1
45% of students knew the definition of a dominant allele.

01.2
Three quarters of students correctly identified 'hh' as the genotype of the white rabbit.

01.3
Three quarters of students successfully identified the correct male gametes and used them to derive the offspring, demonstrating a secure understanding of fundamental genetic principles. A small number of students incorrectly provided diploid or no gametes, preventing them from earning marks for the Punnett Square portion. However, it is worth noting that some of these students were still able to gain marks in subsequent questions, indicating an understanding of other aspects of the problem despite the initial error. Similarly, other students who provided incorrect gametes still managed to pick up some marks elsewhere in their answers.

A common issue observed was students overwriting their letters, making it challenging to distinguish between 'H' and 'h'. For future assessments, students should be advised to clearly cross out any incorrect letters and rewrite their intended answer close to it, to ensure legibility.

01.4
60% of students correctly drew a ring around one homozygous offspring. A little over 10% of students did not attempt this question - even those who gained full marks on **01.3**. Students are reminded to check all question parts, including those without lines or space for an answer. There were a few students who drew a ring around two offspring, and of those that did some drew a ring around both homozygotes, so still gained the mark. A minority were unable to score because they drew a ring around a gamete.

01.5
Only 50% of students were able to identify how many of the offspring would be Himalayan rabbits from their genetic cross. Some students gave '3' as their answer even when this did not match their Punnett Square suggesting they were giving a learnt response rather than one matching their previous answers.

01.6
A pleasing two thirds of students knew that male rabbits have one X chromosome in each body cell.

01.7
Almost three quarters of students correctly predicted the number of female offspring expected - although a range of numbers was seen – including some that were higher than 4. The most common incorrect answers were 1 and 3.