

Inheritance

Mark Scheme 4

Level	IGCSE(9-1)
Subject	Biology
Exam Board	Edexcel IGCSE
Module	Single Award (Paper 2B)
Topic	Reproduction and Inheritance
Sub-Topic	Inheritance
Booklet	Mark Scheme 4

Time Allowed: 44 minutes

Score: /36

Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

Question number	Answer	Notes	Marks								
1 (a)	1. (section of) DNA; 2. (codes) for a protein / polypeptide;	Ignore codes for characteristic	2								
(b) (i)	guanine;	Allow phonetic spelling eg gwanine = 1	1								
(ii)	420;		1								
(c) (i)	<table border="1"> <thead> <tr> <th>Chicken</th> <th>Genotype</th> </tr> </thead> <tbody> <tr> <td>parent with all black feathers</td> <td>$C^B C^B / BB$</td> </tr> <tr> <td>parent with all white feathers</td> <td>$C^W C^W / WW$</td> </tr> <tr> <td>offspring with a mixture of black and white feathers</td> <td>$C^B C^W / BW;$</td> </tr> </tbody> </table>	Chicken	Genotype	parent with all black feathers	$C^B C^B / BB$	parent with all white feathers	$C^W C^W / WW$	offspring with a mixture of black and white feathers	$C^B C^W / BW;$		1
Chicken	Genotype										
parent with all black feathers	$C^B C^B / BB$										
parent with all white feathers	$C^W C^W / WW$										
offspring with a mixture of black and white feathers	$C^B C^W / BW;$										
(ii)	0.5 / ½ / 50% / 2 in 4 / eq;		1								
			Total 6 Marks								

Question number	Answer	Notes	Marks
2(a)	TT and tt;	accept symbols other than T or t	1
	T and t;	eg P and p	1
	Tt; correct Punnett square = 3	parent mark can only be awarded if dominant and recessive letters are the same eg TT and tt or AA and aa TT and DD = 0 allow transfer error (TE) for gametes and offspring if parent genotype wrong allow TE for gametes and offspring	1
(b) (i)	stop <u>cross-pollination</u> / stop cross-pollination described / pollen from one plant getting to different plant / eq; Mendel did it himself / manual pollination / use brush / pollen from plant to (stigma) of plant / self-pollination described / eq; isolate plants (in greenhouse) / keep plants apart / cover plant / keep insects/wind away; eq;	max 2	
(ii)	TT, Tt (Tt) and tt; accept symbols other than T or t eg P and p	allow isolation idea if applied to group of plants reject combinations of different letters eg T and D or T and d or T and S	1

Question number	Answer	Notes	Marks
2 (c)	T / always expressed / expressed in heterozygote / expressed in homozygote and heterozygote / always shown in phenotype / eq;	reject dominates over recessive	1
(d)	<p><u>both</u> / <u>two alleles</u> / <u>equal</u> / eq;</p> <p>reject if reference to genes</p> <p>expressed / contribute / shown / eq;</p> <p>in heterozygote / phenotype / characteristic;</p> <p>example described / intermediate phenotype described / eq;</p>	reject weaker and stronger ignore dominant and recessive	max 2

TOTAL 9 MARKS

Question number	Answer	Notes	Marks
3 (a) (i)	1. homozygous recessive = 11 / eleven; 2. homozygous dominant = 0 / zero / none;		2
(ii)	$(\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}) = 0.125 / 12.5\% / 1/8;$		1
(b)	1. (less) supply of glucose / oxygen; 2. (less) <u>aerobic</u> respiration; 3. (more) <u>anaerobic</u> respiration; 4. less energy / ATP; 5. lactic acid / low(er) pH; 6. enzymes <u>denature</u> ; 7. (muscle) cells die / cannot contract;	1. ignore supply energy Allow idea that before blockage blood supplies oxygen for aerobic respiration for Mp1 and Mp2 7. Ignore fatigue	Max 5

Question number	Answer	Notes	Marks
4 (a)	(i) same <u>alleles</u> / DD / dd / both dominant / both recessive / only one type of allele / eq;	ignore only one allele present allow other letters eg AA or aa. reject <u>genes</u>	1
	(ii) DD; Dd;		2
(b)	(i) mother DD and father dd; Dd and Dd;	Allow any ratio 0:whatever	2
	(ii) zero / 0(%) / no chance / 0 out of 2 / eq;		1
(c)	(i) 22 800 000 / 22.8 million;	allow one mark for 12 or 0.12 in working	2
	(ii) not enough people tested / small sample / only 24 tested / chance / probability / eq;		1
		Total	9

Question number	Answer	Notes	Marks
5 (a)	both characteristics expressed / both alleles are expressed / influence the phenotype (of the heterozygote) / both shown in phenotype / eq;	reject genes ignore same dominance ignore neither dominates	1
(b)	Parents $I^A I^O$ $I^B I^O$; Gametes I^A I^O I^B I^O ; Offspring $I^A I^O$ $I^B I^O$ $I^A I^B$ $I^O I^O$;	allow if I not shown allow all marks if shown as Punnett square transfer error ONLY for gametes mark	3
		Total	4