

Inheritance

Mark Scheme 6

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Inheritance
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 6

Time Allowed: 57 minutes

Score: /47

Percentage: /100

- 1 (a) (i) *accept converse argument*
(more) black moths eaten (by, predators / consumers) ;

(because) black moths, are not camouflaged / do not 'blend in' / AW ; [max. 1]
- (ii) **either**
more black moths would be caught ; **A** numerical answer – see Table 5.1

black moths have better camouflage / AW ;

accept converse argument

or
less of both varieties recaptured ;

death due to the pollution ; [max. 2]
- (b) (i) (first heading) phenotype ;
(second heading) genotype ; [2]
- (ii) (dominant wing colour) pale / speckled ; **A** white [1]

(explanation)

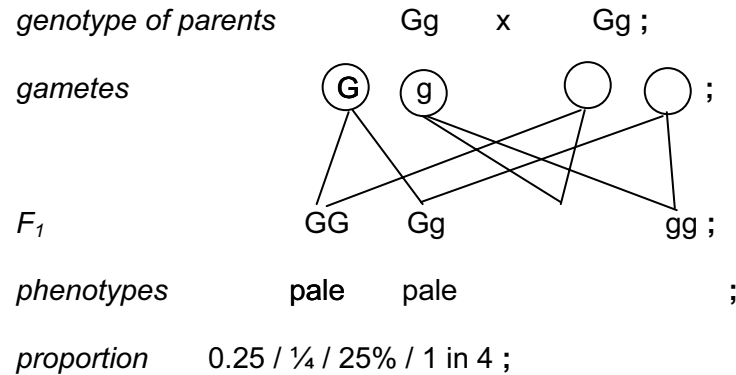
(pale / speckled) appears when,
the dominant allele / **G**, is present ;
in, heterozygous / **Gg** (moths) ;

accept black only appears when, homozygous / **gg** / AW ; [max. 1]
- (c) 1 discontinuous variation ;
2 (wing colour determined by) a, gene / few genes ; **A** ref to alleles
3 black is recessive / pale is dominant ;
4 explanation of inheritance ; *must include ref. to, terms / genotypes*
(black) inherited when parents are, homozygous recessive / **gg**, or heterozygous
(pale) inherited when only one parent has, dominant allele / **G** / AW ;
5 ref to, sexual reproduction / meiosis ; **A** mating / breeding / fertilisation [max. 3]

1 (d)

- accept other letters
- ignore any row headings in candidate answers
- answer may be given with a Punnett square
- gametes may be accepted in the Punnett square even if not labelled as such
- gametes do not have to be circled
- accept contents of Punnett square as F_1 genotypes
- allow ecf if incorrect parental genotypes but only for gametes and F_1 to max 2
- allow ecf if no genotype for parent and gametes are wrong – allow F_1 and phenotype to max 2

put ticks and crosses in a column on right hand side of answer



lines must be correct for F_1 genotype mark

A 1 black to 3 pale but **(R)** 1 in 3 or 3:1 [5]

(e) (mutation ; [1]

(ii) UV light / (ionising) radiation / X rays / (named radioactive) chemical(s) ;
A nuclear fall out [max. 1]

[Total: 17]

Question		Marks	Additional Guidance																									
2 (a) (i)	reptiles ;	[1]																										
(ii)	<table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">go to 2</td> <td style="background-color: #cccccc; width: 30px;"></td> <td rowspan="11" style="vertical-align: top; padding-left: 10px;">; ; ;</td> </tr> <tr> <td style="padding: 2px;">go to 3</td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td style="padding: 2px;">go to 4</td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td style="padding: 2px;"><i>Chalcides minutus</i></td> <td style="text-align: center;">B</td> </tr> <tr> <td style="padding: 2px;">go to 5</td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td style="padding: 2px;">go to 6</td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td style="padding: 2px;"><i>Brookesia perarmata</i></td> <td style="text-align: center;">G</td> </tr> <tr> <td style="padding: 2px;"><i>Calumma parsonii</i></td> <td style="text-align: center;">C</td> </tr> <tr> <td style="padding: 2px;"><i>Amblyrhynchus cristatus</i></td> <td style="text-align: center;">A</td> </tr> <tr> <td style="padding: 2px;"><i>Cyclura lewisi</i></td> <td style="text-align: center;">E</td> </tr> <tr> <td style="padding: 2px;"><i>Abronia graminea</i></td> <td style="text-align: center;">F</td> </tr> <tr> <td style="padding: 2px;"><i>Varanus komodoensis</i></td> <td style="text-align: center;">D</td> </tr> </table>	go to 2		; ; ;	go to 3		go to 4		<i>Chalcides minutus</i>	B	go to 5		go to 6		<i>Brookesia perarmata</i>	G	<i>Calumma parsonii</i>	C	<i>Amblyrhynchus cristatus</i>	A	<i>Cyclura lewisi</i>	E	<i>Abronia graminea</i>	F	<i>Varanus komodoensis</i>	D	[3]	5/6 right = 3 3/4 right = 2 1/2 right = 1 0 right = 0
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Question		Marks	Additional Guidance
2 (b)	encourages biodiversity ; ora prevents extinction ; encourages genetic diversity (within each species) ; maintain food, webs/chains ; food for predators ; increasing research / source of medicine ; AVP ; ; e.g. maintain habitats for other organisms / ethical / moral / aesthetic reasons / tourism	max [3]	A species diversity A an example of feeding
(c) (i)	reduced genetic diversity ; identical offspring ; negative traits passed on ; more competition for local resources ; less chance of survival in a varying environment ; one disease could wipe out total population ; AVP ; e.g. less chance of evolving	max [2]	A no genetic diversity A unfavourable / bad traits.
(ii)	offspring may not be as well adapted to environment ; slower process / takes longer (than asexual reproduction) ; requires partner / two parents ; less energy efficient / requires more energy / many eggs is wasteful ; AVP ;	max [2]	A description e.g. good characteristics are not always passed on.
(d) (i)	reduction division / chromosome number is halved / one set of chromosomes ; diploid to haploid ; for production of gametes ; daughter cells are not genetically identical / genetically different ;	[2]	to each other or parent

Question		Marks	Additional Guidance
2 (ii)	for adaption to, new / changed environment ; causes (genetic) variation ; competition for survival ; best suited reproduce ; allows natural selection ; allows evolution ; AVP ;	max [3]	ignore mutations unqualified.
		[Total: 16]	

3	(a) (i)	pollen / male gamete ;	[1]	R gamete unqualified
	(ii)	chromosome number halved / becomes haploid ; genetic / DNA variation ; new combinations of alleles ; fertilisation restores diploid number in zygote / ensures number of chromosome remains constant in next generation ;	[max 2]	
	(b) (i)	pollen from anther to stigma ; between different plants of same species ;	[2]	
	(ii)	large petals ; pattern / guide lines on petals ;	[ma 1]	
	(c) (i)	temperature / warmth ; light ; water availability ; wind ; pollinator life-cycle timings ; CO ₂ concentration ; pressure ;	[ma 1]	
	(ii)	influence by genes and environment ; range of phenotypes / flowering times results ; (flowering time) is measurable ;	[ma 2]	

<p>3 (d)</p>	<p>1 2 3 4 5 6 7 8 9 10</p>	<p>different environments have different selection / competition pressures ; variation occurs (at fertilization / meiosis) ; ref to mutation ; best adapted organisms most likely to survive ; (those that survive) pass on their alleles / genes ; competition for survival ; cross pollination ensures more variation (than self-pollination) ; reproductive isolation (by different flowering times) ; changes enhanced over generations ; no cross-pollination between low and high altitude plants ;</p>	<p>[max 5]</p>	<p>A Survive and reproduce <i>Idea of best adapted</i></p>
		<p>[Total:14]</p>		