

# 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

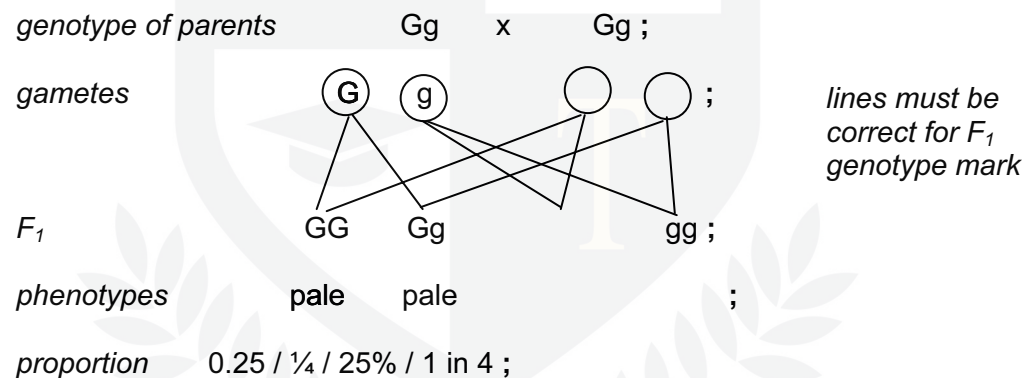
Percentage: /100

- 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><tr><td>go to 2</td><td></td></tr><tr><td>go to 3</td><td></td></tr><tr><td>go to 4</td><td></td></tr><tr><td><i>Chalcides minutus</i></td><td>B</td></tr><tr><td>go to 5</td><td></td></tr><tr><td>go to 6</td><td></td></tr><tr><td><i>Brookesia perarmata</i></td><td>G</td></tr><tr><td><i>Calumma parsonii</i></td><td>C</td></tr><tr><td><i>Amblyrhynchus cristatus</i></td><td>A</td></tr><tr><td><i>Cyclura lewisi</i></td><td>E</td></tr><tr><td><i>Abronia graminea</i></td><td>F</td></tr><tr><td><i>Varanus komodoensis</i></td><td>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)	<p>encourages biodiversity ; <b>ora</b></p> <p>prevents extinction ;</p> <p>encourages genetic diversity (within each species) ;</p> <p>maintain food, webs/chains ;</p> <p>food for predators ;</p> <p>increasing research / source of medicine ;</p> <p>AVP ;</p> <p>e.g. maintain habitats for other organisms / ethical / moral / aesthetic reasons / tourism</p>	max [3]	<p><b>A</b> species diversity</p> <p><b>A</b> an example of feeding</p>
(c) (i)	<p>reduced genetic diversity ;</p> <p>identical offspring ;</p> <p>negative traits passed on ;</p> <p>more competition for local resources ;</p> <p>less chance of survival in a varying environment ;</p> <p>one disease could wipe out total population ;</p> <p>AVP ; e.g. less chance of evolving</p>	max [2]	<p><b>A</b> no genetic diversity</p> <p><b>A</b> unfavourable / bad traits.</p>
(ii)	<p>offspring may not be as well adapted to environment ;</p> <p>slower process / takes longer (than asexual reproduction) ;</p> <p>requires partner / two parents ;</p> <p>less energy efficient / requires more energy / many eggs is wasteful ;</p> <p>AVP ;</p>	max [2]	<b>A</b> description e.g. good characteristics are not always passed on.
(d) (i)	<p>reduction division / chromosome number is halved / one set of chromosomes ;</p> <p>diploid to haploid ;</p> <p>for production of gametes ;</p> <p>daughter cells are not genetically identical / genetically different ;</p>	[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.
		<b>[Total: 16]</b>	

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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 <sub>2</sub> concentration ; pressure ;	[ma 1]	
	(ii)	influence by genes and environment ; range of phenotypes / flowering times results ; (flowering time) is measurable ;	[ma 2]	

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— TUITION —

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