

Question number	Answer			Notes	Marks												
1 (a)	<table border="1"> <thead> <tr> <th data-bbox="474 232 707 414">genotype</th> <th data-bbox="707 232 1001 414">description of genotype</th> <th data-bbox="1001 232 1247 414">phenotype</th> </tr> </thead> <tbody> <tr> <td data-bbox="474 414 707 523">(LL)</td> <td data-bbox="707 414 1001 523">(homozygous dominant)</td> <td data-bbox="1001 414 1247 523">long winged</td> </tr> <tr> <td data-bbox="474 523 707 632">(LI)</td> <td data-bbox="707 523 1001 632">(heterozygous)</td> <td data-bbox="1001 523 1247 632">long winged;</td> </tr> <tr> <td data-bbox="474 632 707 810">ll;</td> <td data-bbox="707 632 1001 810"><u>homozygous</u> <u>recessive;</u></td> <td data-bbox="1001 632 1247 810">(short winged)</td> </tr> </tbody> </table>			genotype	description of genotype	phenotype	(LL)	(homozygous dominant)	long winged	(LI)	(heterozygous)	long winged;	ll;	<u>homozygous</u> <u>recessive;</u>	(short winged)	long winged x 2 = 1 mark	3
genotype	description of genotype	phenotype															
(LL)	(homozygous dominant)	long winged															
(LI)	(heterozygous)	long winged;															
ll;	<u>homozygous</u> <u>recessive;</u>	(short winged)															
(b)	<table border="1"> <thead> <tr> <th data-bbox="474 925 728 964">number</th> <th data-bbox="728 925 911 964">tick</th> </tr> </thead> <tbody> <tr> <td data-bbox="474 964 728 1003">204</td> <td data-bbox="728 964 911 1003"></td> </tr> <tr> <td data-bbox="474 1003 728 1043">408</td> <td data-bbox="728 1003 911 1043">✓</td> </tr> <tr> <td data-bbox="474 1043 728 1082">612</td> <td data-bbox="728 1043 911 1082"></td> </tr> <tr> <td data-bbox="474 1082 728 1112">816</td> <td data-bbox="728 1082 911 1112"></td> </tr> </tbody> </table>			number	tick	204		408	✓	612		816		more than one tick = 0	1		
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Question number	Answer	Notes	Marks
1 (c)	<u>fruit</u> → <u>yeast</u> → <u>flies</u> ; arrows used and correct;	yeast in middle =1	2
(d) (i)	type of fruit / eq; mass/amount of fruit / eq; gender / species / type / size of fly; temperature; light; humidity;	ignore number of flies / time	max 2
(ii)	(no) not repeated / only done once / use more flies / eq; (yes) used lots of flies;		1
		Total	9

Question number	Answer	Notes	Marks
2 (a)	1 ZZ 2 Z 3 ZZ 4 male	ZW; (gender must be clear) Z (and) W; ZW; female;	4
(b) (i)	protein; amino acids / muscles / bone / enzymes / cells / tissues / eq;	ignore calcium ignore vitamins	2
(ii)	fats / lipids / cholesterol / (named) carbohydrate; energy / cell membrane;		Max 1
(iii)	respiration; (less) dehydration / eq; protection / less chance of breaking / prevents cracking / eq; cheese / fish / eggs / milk / low-fat spreads / yoghurt / liver / carrots / sweet potatoes / eq; immunity / vision (in dim light) / healthy skin / bone <u>metabolism</u> / gene transcription / embryo development / eq;		2
(c)	meiosis; gametes / sex cells / sperm <u>and</u> egg; haploid / n / half / 23; fertilization / fuse / combine / join / eq; diploid / 2n / full set / 46;		Max 3
		Total	12

Question number	Answer	Notes	Marks
3 (a) (i)	parents: Aa Aa; gametes: A a A a; offspring: AA Aa Aa aa; phenotypes: short short short average;	allow parent, gamete and offspring marks in Punnett square if parent genotypes wrong allow ecf to max of 3 for gametes, offspring and phenotypes allow if other symbols used allow other terms for short and average eg achondroplasia and tall only give phenotype mark if it is clear that candidate knows there are three short and one average a statement that the phenotypes are short and average = 0	4
(b)	$\frac{1}{4}$ / 25% / 0.25 / 1 in 4 / eq;	ecf	1

Question number	Answer	Notes	Marks
3 (c) (i)	always / in heterozygote / in both heterozygote and homozygote / eq; expressed / seen / shown / determines characteristic / develops the trait / (in phenotype) / eq;	ignore stronger / overpowers / masks	Max 2
(ii)	1. those with achondroplasia less likely to have children / reproduce / eq; 2. allele is rare / eq; 3. selective advantage for aa / eq;	allow converse for all points allow health implications for achondroplasia	Max 2

Total 9 marks

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4 (a)	<table border="1"> <thead> <tr> <th>Order</th> <th>Name of stage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>gametes;</td> </tr> <tr> <td>2</td> <td>zygote</td> </tr> <tr> <td>3</td> <td>embryo</td> </tr> <tr> <td>4</td> <td>foetus;;</td> </tr> <tr> <td>5</td> <td>baby</td> </tr> </tbody> </table>	Order	Name of stage	1	gametes;	2	zygote	3	embryo	4	foetus;;	5	baby	<p>1 mark for gametes</p> <p>1 mark for baby</p> <p>2 marks for zef</p> <p>1 mark for zfe or ezf or fez</p>	4
Order	Name of stage														
1	gametes;														
2	zygote														
3	embryo														
4	foetus;;														
5	baby														
(b) (i)	connection between <u>atria</u> / eq; connection between arteries / pulmonary artery and aorta;		2												
(c) (i)	XY;		1												
(ii)	46 or 23 <u>pairs</u>		1												

TOTAL 8 MARKS