

WJEC (Eduqas) Biology GCSE  
Topic 7.2 Inheritance  
Questions by Topic - Mark  
Scheme

1.			Question	Marking details	Marks Available
1	(a)	(i)	Nucleus;		1
		(iii)	Gametes;		1

2.		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(b)	(i)		1	Gametes;			
(c)	(i)		1	<u>new corals</u> remain attached to parent			
	(ii)		2	1.34 (written on answer line) = 2 marks 1.34 m (not written on answer line) = 2 marks  Allow 1 mark if answer expressed in cm (134) Allow 1 mark for (8.5x14) + 15 but incorrect answer Allow 1 mark for 1.34 (not written on the answer line and without any units			

3.			Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept									
(a)				1	an allele which when present in the heterozygous condition expresses itself in the phenotype (OWTTE);	Allele which is always expressed if present		Stronger allele									
(b)	(i)			1	Bb X Bb; both required for mark [1]			<i>if a letter other than b is chosen</i>									
	(ii)			2	<table border="1" style="margin-left: 20px;"> <tr> <td>Gametes</td> <td><b>B</b></td> <td><b>b</b></td> </tr> <tr> <td><b>B</b></td> <td><b>BB</b></td> <td><b>Bb</b></td> </tr> <tr> <td><b>b</b></td> <td><b>Bb</b></td> <td><b>bb</b></td> </tr> </table> <p>Gametes correct; [1] Mechanics of cross correct; [1]</p>	Gametes	<b>B</b>	<b>b</b>	<b>B</b>	<b>BB</b>	<b>Bb</b>	<b>b</b>	<b>Bb</b>	<b>bb</b>	ECF from (b)(i) If gametes are incorrect allow ECF for mechanics mark		X and Y
Gametes	<b>B</b>	<b>b</b>															
<b>B</b>	<b>BB</b>	<b>Bb</b>															
<b>b</b>	<b>Bb</b>	<b>bb</b>															
	(iii)			1	6	ECF from (b)(ii)		75%									
(c)				2	<b>Phenotype</b> Manx/ (cat with)no tail X (cat with normal) tail/non manx; <b>Genotype</b> <b>Bb X bb;</b>	Possible ECF of letters from previous section	(Manx with) normal tail										
				7													

4.			Question	Marking details	Marks Available
4	(a)			There are {46 chromosomes/(23) pairs/has a diploid number/ not haploid/has both X and Y;	1
	(b)			No {corresponding/matching} part of chromosome (for paired allele)/only has one X chromosome/ only has one {copy of the gene/allele};	1
	(c)			Linearly/in a line/in a row;	1
				<b>Question4 total</b>	<b>[3]</b>

5.			Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)			1	10;	5 pairs		
	(ii)			1	Y (chromosome)/ has XY (chromosomes);	Only 1 X (chromosome)		
	(iii)			1	5; ECF from (i)			
(b)	(i)			1	nucleus;			
	(ii)			1	DNA;			
	(iii)			1	protein;			

6.

Question

Marking details

Marks Available

(a)

Gametes	A	A
a	Aa	Aa
a	Aa	Aa

[2]

Award 1 mark for all 4 gametes being correct (Must use A and a);

Award 1 mark for the mechanics of the cross; Award this mark even if the gametes are incorrect or the wrong letters are used.

(b) (i)

Gametes	A	a
A	AA	Aa
a	Aa	aa

[2]

Award 1 mark for all 4 gametes being correct;

Award 1 mark for the mechanics of the cross; Award this mark even if the gametes are incorrect

ECF- both these marks can be awarded if letters used in (a) are carried forward into (b). Also award the marks if any two F1 individuals are selfed.

(ii) 3 grey bodied: 1 black bodied (or correct ratio from given)

7.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a) i	1	Nn;	heterozygous		
ii	2	He does not have cystic fibrosis therefore must have a {N/dominant allele} / He has to have a {N /dominant allele} to give to {the child without cystic fibrosis/ child 3};  Has to have a {n/recessive allele/ allele for cystic fibrosis } to give to {child with cystic fibrosis/ child 4} {child 4/ child with cystic fibrosis} has to have a {n/recessive allele} from him;			
(b) i	1	Nn;	heterozygous		
ii	2	She does not have cystic fibrosis and therefore must have a { N allele/dominant allele}/ person 3 gets { N allele/dominant allele} from person 2;  Her mother has {cystic fibrosis/ nn} and therefore must give one {n allele/recessive allele}/ person 3 gets {n allele/recessive allele} from person 1;			
(c)	1	25%;			
Total Mark	7				

8.	Question	Marking details	Marks Available									
	(a)	(i) B- 6 black and 2 white;										
		(ii) Allow ECF from (a) (i)										
		Gametes correct; Must be B	1									
		Must link to answer to a(i)	1									
		Cross correct;										
		<table border="1"> <tr> <td>Gametes</td> <td>B</td> <td>b</td> </tr> <tr> <td>B</td> <td>BB</td> <td>Bb</td> </tr> <tr> <td>b</td> <td>Bb</td> <td>bb</td> </tr> </table>	Gametes	B	b	B	BB	Bb	b	Bb	bb	
Gametes	B	b										
B	BB	Bb										
b	Bb	bb										
	(b)	(i) I XY both correct 1 mark	1									
		II XX;										
		Gametes correct; (ECF)										
		Cross correct;	1									
			1									
		<table border="1"> <tr> <td>Gametes</td> <td>X</td> <td>Y</td> </tr> <tr> <td>X</td> <td>XX</td> <td>XY</td> </tr> <tr> <td>X</td> <td>XX</td> <td>XY</td> </tr> </table>	Gametes	X	Y	X	XX	XY	X	XX	XY	
Gametes	X	Y										
X	XX	XY										
X	XX	XY										
		Question 8 Total	[6]									

9.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
(a)	i	1	the mother <b>Nn</b> and the father <b>Nn</b> ; (both correct for 1 mark)												
	ii	1 1	gametes correct from ai; mechanics of cross correct – this mark can be awarded even if the gametes are incorrect; <table border="1"> <tr> <td></td> <td><b>N</b></td> <td><b>n</b></td> </tr> <tr> <td><b>N</b></td> <td><b>NN</b></td> <td><b>Nn</b></td> </tr> <tr> <td><b>n</b></td> <td><b>Nn</b></td> <td><b>nn</b></td> </tr> </table>		<b>N</b>	<b>n</b>	<b>N</b>	<b>NN</b>	<b>Nn</b>	<b>n</b>	<b>Nn</b>	<b>nn</b>	ecf from ai  Use of wrong letters from ai (except X and Y)		Any reference to X and Y
	<b>N</b>	<b>n</b>													
<b>N</b>	<b>NN</b>	<b>Nn</b>													
<b>n</b>	<b>Nn</b>	<b>nn</b>													
	iii	1	circle around <b>nn</b> ;			any other letters									
	iv	1	$\frac{3}{4}$ / 75%/ 0.75/ three out of four; <b>must relate to their Punnett square</b>			ratio/ no credit if any letters other than Nn used									

10.

Question	Marking details	Marks Available
(a)	{the <u>genes/all the alleles</u> } in {an <u>organism/dog/it</u> }/ the {set/pair/two/both} <u>alleles</u> that {determine/control} {a characteristic/colour} of the dog/ the genetic make-up of {an organism/dog};	1
(b)	(i) {Cross/mate/breed} {the (black) Labrador/ it} with {a yellow Labrador/bb}/do a test cross; If all the {puppies/litter} are black then {the (black) Labrador/ it} is {homozygous/BB}; If there are yellow puppies in the litter then {the (black) Labrador/ it} is {heterozygous/Bb};	3

(ii) 1 mark for each correct Punnett square;; 2

Gametes	B	B	Gametes	B	b
b	B	Bb	b	Bb	b
	b			b	
b	B	Bb	b	Bb	b
	b			b	

**Alternative marking option**

(b)	(i) Cross/mate/breed} the black Labrador with another Black Labrador which is known to be {heterozygous/Bb}; If all the puppies are black then the black Labrador is {homozygous/BB}; If there are some yellow puppies in the litter then the black Labrador is {heterozygous/Bb};	3
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Question	Marking details	Marks Available
(ii)	1 mark for each correct Punnett square;	2

Gametes	B	B	Gametes	B	b
B	BB	BB	B	BB	BB
b	Bb	Bb	b	Bb	bb

If bi not completed then first marking option must be used for marking punnett squares

11.	Question	Marking details	Marks Available
	(a)	(i) <u>bronchioles</u> ;	1
		(ii) A/heterozygous for cystic fibrosis;	1
		(iii) C/homozygous recessive for cystic fibrosis;	1
		(iv) A/25%;	1
		(v) C/males and females;	1
	<b>Question11 Total</b>		<b>[8]</b>

12.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept									
	(a)	1	{Both/ the two} alleles are different/ where one of the alleles is dominant and the other is recessive/ the alleles of a gene are different;												
	(b) (i)	1	3 (purple) : 1 (green)												
	(ii)	1	<b>both required for 1 mark</b> Must be upper case and lower case of the <u>same</u> letter. Letters should be carefully chosen, if the upper case and lowercase letters have the same form, eg P and p or C and c then it must be clear in the answer (and in the Punnett square below) that upper and lower case letters are being used. If this is unclear or ambiguous then do not award the mark/marks.												
		2	<table border="1" style="margin-left: 20px;"> <tr> <td></td> <td>N</td> <td>n</td> </tr> <tr> <td>N</td> <td>NN</td> <td>Nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> </table> gametes correct – according to chosen letters in (ii)(i) above; ECF allowed from (ii)(i) e.g. if two different letters chosen to represent the alleles  mechanics of cross (possible to gain mark even if gametes are incorrect); NOT if more than two alleles are shown		N	n	N	NN	Nn	n	Nn	nn			
	N	n													
N	NN	Nn													
n	Nn	nn													
	(iii)	1	$\frac{1}{2}$ / 0.5 / 50%												
	<b>Total Mark</b>	<b>6</b>													

13.	Question				Marking details			Marks available				
								AO1	AO2	AO3	Total	Maths
13												
	(b)	(i)	I	DD		1		1				
			II	dd		1		1				
		(ii)		purple (flower)			1	1				
		(iii)		one dominant and one recessive (1) allele (1) reject gene different alleles of the same gene = 2 marks there are different alleles = 1 mark	2			2				
				<b>Question 13 total</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>0</b>		

14.	Question			Marking details	Marks Available								
14	(a)	(i)	One {form/version/variant} of a gene/{two/different}{forms/types/versions} of {the <u>same/a</u> } gene;	1									
		(ii)	<ul style="list-style-type: none"> <li>In a {heterozygous organism/OWTTE} the allele that is not {expressed/shown}/</li> <li>only {expressed/shown} {when homozygous/when in a pair of recessive alleles}/</li> </ul>	1									
	(b)	(i)	Gametes correct (must use correct letter for this mark);  Mechanics of cross correct; Allow ECF of incorrect gametes but must use B/b <table border="1" style="margin: 10px auto; width: 60%;"> <tr> <td>Gametes</td> <td><b>B</b></td> <td><b>b</b></td> </tr> <tr> <td><b>B</b></td> <td><b>BB</b></td> <td><b>Bb</b></td> </tr> <tr> <td><b>b</b></td> <td><b>Bb</b></td> <td><b>bb</b></td> </tr> </table>	Gametes	<b>B</b>	<b>b</b>	<b>B</b>	<b>BB</b>	<b>Bb</b>	<b>b</b>	<b>Bb</b>	<b>bb</b>	2
Gametes	<b>B</b>	<b>b</b>											
<b>B</b>	<b>BB</b>	<b>Bb</b>											
<b>b</b>	<b>Bb</b>	<b>bb</b>											
		(ii)	75%/ 0.75/ ¾/ 3 in 4; NOT ratio	1									
		(iii)	3 : 1 ;	1									
			<b>Question 14 Total</b>	<b>[6]</b>									

15.

Question	Marking details	Marks Available
15 (a)	All correct 1 mark Mouse 1 <b>BB</b> - black Mouse 2 <b>Bb</b> - black Mouse 3 <b>bB</b> - black Mouse 4 <b>bb</b> - red	1

- (b) (i) 12; 1  
 (ii) All correct no errors 1

Gametes	<b>B</b>	<b>B</b>
<b>b</b>	<b>Bb</b>	<b>Bb</b>
<b>b</b>	<b>Bb</b>	<b>Bb</b>

- (c) (i) 25; 1  
 (ii) All correct no errors 1

Gametes	<b>B</b>	<b>b</b>
<b>b</b>	<b>Bb</b>	<b>bb</b>
<b>b</b>	<b>Bb</b>	<b>bb</b>

Question	Marking details	Marks Available
(a) (i)	Nn;	1
(ii)	Nn;	1
(b)	50(%)	1

16.

Question		Marking details	Marks available														
			AO1	AO2	AO3	Total	Maths	Prac									
(a)	(i)	Offspring/results are obtained quickly/ does not take a long time to get results/ short life cycle		1		1		1									
	(ii)	(Greater) confidence in result	1			1		1									
(b)	(i)	either of the 2 flies with dark end to abdomen		1		1											
		Gametes correct (1) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Gametes</td> <td>R</td> <td>R</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>Rr</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>Rr</td> </tr> </table> Mechanics correct (1)	Gametes	R	R	r	Rr	Rr	r	Rr	Rr		2		2		
Gametes	R	R															
r	Rr	Rr															
r	Rr	Rr															
(c)	(i)	All ratios 3: 1		1		1	1										
	(ii)	{Flies/ embryos/ they} died/ one or both flies were {sterile/ infertile} flies did not mate/ flies diseased/ eggs did not hatch/ develop Reject no offspring unqualified			1	1											
	(iii)	Results for red eyed flies and white eyed flies have been inserted in wrong columns/ OWWTE Do not accept that the wrong flies were mated because no cross could produce this ratio. Do not accept a mutation occurred			1			1 1									
	(iv)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Gametes</td> <td>R</td> <td>r</td> </tr> <tr> <td>R</td> <td>RR</td> <td>Rr</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>rr</td> </tr> </table> Gametes correct 1 mark Mechanics correct 1 mark	Gametes	R	r	R	RR	Rr	r	Rr	rr		2		2		
Gametes	R	r															
R	RR	Rr															
r	Rr	rr															
<b>Question 17 total</b>			<b>1</b>	<b>7</b>	<b>2</b>	<b>10</b>	<b>1</b>	<b>4</b>									

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept									
(a)	1	an allele which when present in the heterozygous condition expresses itself in the phenotype (OWTTE);	Allele which is always expressed if present		Stronger allele									
(b)	(i)	Bb X Bb; both required for mark [1]			if a letter other than <b>b</b> is chosen									
	(ii)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Gametes</td> <td><b>B</b></td> <td><b>b</b></td> </tr> <tr> <td><b>B</b></td> <td><b>BB</b></td> <td><b>Bb</b></td> </tr> <tr> <td><b>b</b></td> <td><b>Bb</b></td> <td><b>bb</b></td> </tr> </table> Gametes correct; [1] Mechanics of cross correct; [1]	Gametes	<b>B</b>	<b>b</b>	<b>B</b>	<b>BB</b>	<b>Bb</b>	<b>b</b>	<b>Bb</b>	<b>bb</b>	ECF from (b)(i) If gametes are incorrect allow ECF for mechanics mark		X and Y
Gametes	<b>B</b>	<b>b</b>												
<b>B</b>	<b>BB</b>	<b>Bb</b>												
<b>b</b>	<b>Bb</b>	<b>bb</b>												
	(iii)	6	ECF from (b)(ii)		75%									
(c)	2	<b>Phenotype</b> Manx/ (cat with)no tail X (cat with normal) tail/non manx; <b>Genotype</b> <b>Bb X bb;</b>	Possible ECF of letters from previous section	(Manx with) normal tail										
		7												

19.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept									
(a) (i)	1 1	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>D</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> </table> <p><b>F1</b></p> <p>Gametes correct 1 mark Mechanics of cross correct 1 mark If use different letters cannot award gametes mark but can award mechanics mark</p>	Gametes	D	D	d	Dd	Dd	d	Dd	Dd			
Gametes	D	D												
d	Dd	Dd												
d	Dd	Dd												
(a) (ii)	1 1	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>d</td> </tr> <tr> <td>D</td> <td>DD</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>dd</td> </tr> </table> <p><b>F2</b></p> <p>Gametes correct 1 mark <b>Must use any two of their F<sub>1</sub> offspring from (i)</b> Mechanics of cross correct (<b>must generate a 3:1 ratio</b>) [If incorrect letters are used in (a)(i) allow ECF for (a)(ii) to access both marks] If different letters used in second punnett square to first = 0 marks</p>	Gametes	D	d	D	DD	Dd	d	Dd	dd			
Gametes	D	d												
D	DD	Dd												
d	Dd	dd												
(b)	1	repeatability/increased confidence in results	Identify anomalies		Reliability/accuracy/validity/reproducibility									
(c)	1	So that the {work/results/experiments} can be {verified/confirmed}/to see if they get the {same/ similar/different} results/reproducibility;		To see if Mendels work was right/ correct/ true	Repeatability/validity/accuracy/reliability									
Total Mark	6													

20.

Question	Marking details	Marks Available
20 (a) (i)	23;	2
(ii)	46;	
(b)	50%;	1
<b>Question 20 Total</b>		<b>[3]</b>