



Question number	Answer	Notes	Marks
1 (a)	1. . parents are BB and bb; 2. . first generation is Bb;	no TE	2
(b)	1. . gametes B and b; 2. second generation BB, Bb, Bb and bb;	allow TE for 1 mark for correct offspring from incorrect gametes	2
(c)	1. sperm; 2. .fertilisation / fusion; 3. .zygote; 4. . diploid; 5. .mitosis; 6. 40 / forty / 20 pairs;		6

Total 10 marks

Question number	Answer	Notes	Marks
2(a) (i)	47;		1
(ii)	male;		1
(b)	1. has more than 46 / has extra chromosome / trisomy; 2. (which is) sex chromosome / Y / eq;	Ignore 47 alone Has an extra sex chromosome =2	2
(c) (i)	meiosis;		1
(ii)	1. failure of chromosomes to separate / eq; 2. (gamete) has an extra chromosome / YY; 3. normal egg/gamete fertilised by abnormal sperm/gamete;		2

Total 7 marks

Question number	Answer	Notes	Marks
3(a)	<p>P mm Mm;</p> <p>G m M m;</p> <p>O Mm mm;</p> <p>Ph Marfan / eq unaffected;</p>	<p>G. Clear separation of gametes</p> <p>Ph. Allow half Marfan and half unaffected even if not linked to genotypes</p> <p>Allow max from Punnett square</p> <p>Allow 3 max for TE</p> <p>Allow other symbols</p>	4
(b)	<p>(i) some people do not have obvious symptoms / some people with symptoms/long fingers/tall do not have condition / heart problems/eyesight problems may have other causes / eq;</p> <p>(ii) 1. look at parents / family history;</p> <p>2. genetic test / analyse DNA / eq;</p> <p>3. look for combination of symptoms / look for tall and eyesight / eq;</p>	<p>3. Allow any 2 symptoms</p>	<p>1</p> <p>2</p>

Question	Answer	Notes	Marks
(c)	1. condition present in offspring but not in parents; 2. it skips generations / eq; 3. carriers (present);		3

Total 10 marks

Question number	Answer	Notes	Marks												
4 (a)	<table><tr><th>Genotype</th><th>Alleles</th><th>Expected number of digits per hand</th></tr><tr><td>(homozygous dominant)</td><td>DD;</td><td>(s</td></tr><tr><td>homozygous <u>recessive</u>;</td><td>(dd)</td><td>5 / five;</td></tr><tr><td>(heterozygous)</td><td>(Dd)</td><td>6 / six;</td></tr></table>	Genotype	Alleles	Expected number of digits per hand	(homozygous dominant)	DD;	(s	homozygous <u>recessive</u> ;	(dd)	5 / five;	(heterozygous)	(Dd)	6 / six;		4
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(homozygous dominant)	DD;	(s													
homozygous <u>recessive</u> ;	(dd)	5 / five;													
(heterozygous)	(Dd)	6 / six;													
(b)	<table><tr><th>Parent genotypes</th><th>Probability of child with polydactyly</th></tr><tr><td>(Dd x DD)</td><td>1.0;</td></tr><tr><td>(Dd x dd)</td><td>(0.5)</td></tr><tr><td>(Dd x Dd)</td><td>0.75;</td></tr></table>	Parent genotypes	Probability of child with polydactyly	(Dd x DD)	1.0;	(Dd x dd)	(0.5)	(Dd x Dd)	0.75;		2				
Parent genotypes	Probability of child with polydactyly														
(Dd x DD)	1.0;														
(Dd x dd)	(0.5)														
(Dd x Dd)	0.75;														
			Total 6 marks												

Question number	Answer	Notes	Marks
5	<p>C leaves from top and bottom;</p> <p>O same species / same tree / same age of tree / eq;</p> <p>R repeat / many trees / many leaves / eq;</p> <p>M1 METHOD OF MEASUREMENT: chlorophyll / colour / chromatography / eq;</p> <p>M2 METHOD OF EXTRACTION: (heat with) ethanol / crush / eq;</p> <p>S1+S2 same location / soil / time of year / day / mass / surface area / eq;;</p>		6
			Total 6 marks

Question number	Answer	Notes	Marks
6 (a)	1. source of food / source of nutrients / eq; 2. smell eq;		1 max
(b)	1. Cheviot and East Friesian (chosen); 2. (parent sheep with) bare legs <u>and</u> (parent sheep with) bare backsides; 3. cross breed / mate / eq; 4. <u>select/choose/use</u> offspring with bare legs <u>and</u> bare back side; 5. repeat / many generations / eq;		4 max
(c)	1. farmer / humans you (choose parents) / eq; 2. ster process / eq; 3. ds not affect survival / no survival of fittest / no competition / adaptations may not improve survival / eq;	Allow converse	2

(d)	<p>1. lls/harms other organisms / not specific / eq;</p> <p>2. fect <u>food chain</u> / bioaccumulation / eq;</p> <p>3. sistance;</p>	<p>Ignore pollution / harm to sheep or crops or meat or wool or humans</p> <p>Ignore immune</p> <p>Ignore cost / reapplication</p>	2 max
			Total 9 marks

Question number	Answer	Notes	Marks
7	<p>humans / people / farmers / scientists / breeders / eq;</p> <p>characteristics / features / named feature / traits / qualities / eq;</p> <p>offspring / eq;</p> <p>repeated / continued / done / carried on / ongoing / eq;</p>	<p>ignore genes / genetics</p> <p>ignore successful</p>	4
		Total	4