Question Number	Answer	Acceptable answers	Mark
1(a)(i)	0.5 / 0.5 picogram	Accept: 0.5 picograms accept: the same (mass) as the sperm cell	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	**C** haploid		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	thymine with adenine, cytosine with guanine		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iv)	weak hydrogen bonds / hydrogen bonds / hydrogen (1)	H (bond)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	A description including **three** of the following points: • cell divides / cell division / cell splits(1) • two cells produced (1) • (both) diploid (1) • (both) cells are <u>genetically</u> identical (1)	credit correct reference to stages of mitosis: DNA replication / chromosomes duplicate (1) Chromosomes line up along the equator / middle of the cell (1) chromosomes pulled to either end of cell (1) cytokinesis / cytoplasm splits (1)	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	A description including **three** of the following points: • ref (to many) cell divisions / eq (1) • growth (1) • ref to differentiation / specialisation (1) • ref to stem cells (1)	 accept: gets bigger / larger accept: become specific cells	 **(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	**B** ☒ courtship		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	avoid injury / do not waste energy	avoid a fight idea of dominance / submission feels threatened Ignore : female will pick the biggest antlers / respect	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	An explanation linking • protection (of female during birth / of young) / concealment (1) • from predators / until strong enough (to fend for itself) (1)	 safer camouflaged weather	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c) (i)	A description including two of the following • can eat plants which contain tannins (1) • larger food supply (1) • plants not consumed by other herbivores / less competition from other herbivores / animals (1)	 get more food / less likely to starve / won't starve	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c) (ii)	A description including • (flower) attracts insects (1) • which pollinate the flower (1) • Idea that insect - flower relationship is specific (1)	attraction can be specific in terms of colour, size or scent or nectar or pollen fertilise / reproduce for pollinate e.g. bee and bee orchid	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)	A description including four of the following points • ref to meiosis (1) • 4 cells produced (from one parent cell) (1) • haploid (cells) / cells have half the number of chromosomes (1) • cells are genetically different (1)	do not accept if there is a 't' cells have one set of chromosomes / 23 chromosomes	**(4)**

Question Number		Indicative Content	Mark
QWC	***3(b)**	A description including • fertilisation of egg by sperm • ref to fusion of nuclei • forming diploid cell • ref to zygote • (zygote) divides by mitosis • to form identical cells • several mitotic divisions • growth of foetus • examples of how fetus grows eg in height, mass • stem cells in embryo • specialisation / differentiation of (stem) cells into different cell types • examples of different cell types eg neurones, skin cells • development of fetus	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description including 2 or more comments about one process • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description including 2 or more comments on 2 processes • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description including 2 or more comments on all 3 processes • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
3(c)	Any **two** from the following: • sexual reproduction involves two parents but asexual reproduction only involves one (organism / parent / cell) (1) • sexual reproduction needs gametes / sex cells but asexual reproduction does not (1) • sexual reproduction produces genetically different organisms but asexual reproduction produces genetically identical offspring / clones (1)	ignore any reference to meiosis or mitosis sexual reproduction results in variation but asexual reproduction does not	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)	**D** haploid and haploid		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (b)	A description linking three of the following (DNA is a) double helix (1) the sides of DNA are made from (alternating) sugars and phosphate (molecules) / sugar phosphate backbone (1) {paired / complementary} bases / A (joins to) T and C (joins to) G (1) (bases joined by/strands held together by) hydrogen bonds (1)	 Accept H bonds Ignore h or H_2 bonds	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A description including four of the following: (the process is) translation (1) (mRNA) leaves the nucleus / enters the cytoplasm (1) (mRNA joins to) ribosomes(1) tRNA carries amino acids (1) tRNA joins to mRNA / bases on tRNA matches bases on mRNA (1) (bases read as) {sets of three / triplets / idea of codons} (1) (ribosome / mRNA holds tRNA so) amino acids are joined together / to make polypeptides (1)		**(4)**

Total for Question 4 = 8 marks

Question number	Answer	Mark
5(a)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • Mendel crossed homozygous tall and homozygous short pea plants and produced all tall offspring (1) • therefore all the offspring had a heterozygous genotype with one tall and one short allele showing that the tall allele is dominant (1)	**(2)**

Question number	Answer	Mark
5(b)(i)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • asexual reproduction is a rapid reproduction technique allowing the production of more plants • as there is no requirement for cross pollination/higher crop yield/increased profit	**(2)**

Question number	Answer	Mark
5(b)(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • introduces variation into the population • which allows for natural selection of fitter plants/increased chance of the population surviving	**(2)**

Question number	Answer	Mark
5(c)(i)	C	**(1)**

Question number	Answer	Mark
5(c)(ii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • genotype is X^DX^d/she must have one dominant and one recessive allele (1) • because her daughter must have received the recessive allele and her son has inherited a dominant allele (1)	**(2)**