

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

Question Number	Answer	Acceptable answers	Mark
1 (b)	<p>A description linking three of the following</p> <p>(DNA is a) double helix (1)</p> <p>the sides of DNA are made from (alternating) sugars and phosphate (molecules) / sugar phosphate backbone (1)</p> <p>{paired / complementary} bases / A (joins to) T and C (joins to) G (1)</p> <p>(bases joined by/strands held together by) hydrogen bonds (1)</p>	<p>Accept H bonds Ignore h or H₂ bonds</p>	(3)

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

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	A description that includes two of the following <ul style="list-style-type: none"> hydrogen bonds (1) between (complementary) base pairs (1) 	H bonds accept singular A and T, G and C but not the wrong pairings	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)	<ul style="list-style-type: none"> one bar the height of the guanine bar (34%) and one bar the height of the thymine bar (16%) (1) bars for cytosine and adenine shown the correct way round (1) 	+/- 1 square (including sketches)	(2)

Question Number	Answer	Mark																		
2(c)(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>G</td><td>G</td><td>C</td><td>T</td><td>A</td><td>G</td><td>T</td><td>T</td><td>G</td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>C</td><td>C</td><td>G</td><td>A</td><td></td><td>C</td><td>A</td><td>A</td><td>C</td> </tr> </table> <p>[all correct = 2 marks and 1 mistake = 1 mark]</p>	G	G	C	T	A	G	T	T	G	C	C	G	A		C	A	A	C	(2)
G	G	C	T	A	G	T	T	G												
C	C	G	A		C	A	A	C												

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	three / 3	Reject any other numbers given	(1)

Question Number	Answer	Acceptable answers	Mark
2(d)	ribosome(s) / polysome(s)	Ignore cytoplasm Reject any other structure given	(1)

Question Number	Answer	Acceptable answers	Mark
3 (a)(i)	mitosis	reasonable phonetic spelling provided there is a 't' ignore asexual reproduction	(1)

Question Number	Answer	Acceptable answers	Mark
3 (a)(ii)	Any two from the following: <ul style="list-style-type: none"> • same characteristics in offspring as parent plant /best characteristics inherited / clones produced / identical (1) • easier to generate new plants/propagate (1) • quicker to produce new plants (1) • cheap /idea that the plants will not run out / no need to buy new plants / seeds (1) 	Accept same as parent plant	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)	<u>Stage 1</u> <ul style="list-style-type: none"> • to break open cells/release cell contents / release DNA /dissolve proteins (1) <u>Stage 3</u> <ul style="list-style-type: none"> • to precipitate DNA from the solution/to separate DNA (from other components)/ (1) 	Accept break down cell membrane / cell wall Accept to make DNA visible ignore refs to freezing the DNA	(2)

Question Number	Answer	Acceptable answers	Mark
3 (c)(i)	C 4		(1)

Question Number	Answer	Acceptable answers	Mark
3 (c)(ii)	<ul style="list-style-type: none">• location drawn anywhere in cytoplasm (1)• correct name - nucleus (1)	chloroplast / mitochondria NB these are stand alone mark points	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)	<p>A description including the following linked points</p> <ul style="list-style-type: none"> • ref to a gene (coding for protein)(1) • sequence of bases determines sequence of amino acids (1) • idea of one code / triplet / codon / 3 bases (for one amino acid) (1) • several amino acids make up a protein / (poly)peptide (1) • transcription / detail of transcription (1) • translation / detail of translation (1) 	<p>Accept on either DNA or RNA base pairs</p> <p>Accept a chain of amino acids</p> <p>eg mRNA made</p> <p>eg mRNA attached to ribosome</p>	(4)

Question Number	Indicative Content	Mark
QWC	<p>*4(b)</p> <p>A description including some of the following points in a logical sequence</p> <p>Points relating to DNA structural features:</p> <ul style="list-style-type: none"> • two strands • double helix • (contains) bases • A, T, C, G • adenine / A paired with thymine / T • guanine / G paired with cytosine / C • hydrogen / H bonds joining bases <p>Contributions from Scientists:</p> <ul style="list-style-type: none"> • X-ray (crystallography) being used • to show helical structure • to show diameter of molecule • how base pairs are arranged was shown • how strands are arranged was shown • modelling • reference to using other people's ideas 	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited description that includes either: at least three DNA features OR one contribution • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple description that includes at least three features of DNA and at least one contribution OR two features of DNA and two contributions. • 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	<ul style="list-style-type: none"> • a detailed description of the structure of DNA that includes at least three features and two contributions. • 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
4(c)	<p>An explanation to include two of the following points linked together</p> <ul style="list-style-type: none"> • genes / base sequence (on human chromosome) identified (1) • identification of faulty / mutated genes (1) • people can be tested for a genetic disorder (1) • ref to development of gene therapy (1) • idea that appropriate /early /personalised / genomic medication / counselling can be given (1) 	<p>Accept base pair sequence gene map</p> <p>Accept idea that genes can be linked to disease</p> <p>Accept diagnosis of cancer</p> <p>Accept a description of gene therapy</p>	(2)