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

Question Number	Answer	Acceptable answers	Mark
1 (b)	A description linking three of the following		(3)
	(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	

Question	Answer	Acceptable answers	Mark
Number 1(c)	A description including four of		(4)
	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)		

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	A description that includes two of the following • hydrogen bonds (1)	H bonds accept singular	
	 between (complementary) base pairs (1) 	A and T, G and C but not the wrong pairings	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)	 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 	+/- 1 square (including sketches)	
	way round (1)		(2)

Question Number 2(c)(i)	Answe	er									N	Mark
	G	G	С	Т	А	G	Т	Т	G			
	G	G	C	l	А	G	ı	I	G			
	С	С	G	Α		С	Α	Α	С			
	[all co	rrect	= 21	marks	s and	1 mi	stake	= 1 ma	rk]		((2)

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

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

Question	Answer	Acceptable answers	Mark
Number			
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:		
	 same characteristics in offspring as parent plant /best characteristics inherited / clones produced / identical (1) easier to generate new plants/propagate (1) 	Accept same as parent plant	
	 quicker to produce new plants (1) 		
	cheap /idea that the plants will not run out / no need to buy new plants / seeds (1)		(2)

Question Number	Answer	Acceptable answers	Mark
3 (b)	 Stage 1 to break open cells/release cell contents / release DNA /dissolve proteins (1) Stage 3 	Accept break down cell membrane / cell wall	
	to precipitate DNA from the solution/to separate DNA (from other components)/ (1)	Accept to make DNA visible ignore refs to freezing the DNA	(2)

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

Question Number	Answer	Acceptable answers	Mark
3 (c) (ii)	 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)	A description including the following linked points • 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) 	Accept on either DNA or RNA base pairs Accept a chain of amino acids	
	 several amino acids make up a protein / (poly)peptide (1) 	eg mRNA made	
	 transcription / detail of transcription (1) 	eg mRNA attached to ribosome	(4)
	 translation / detail of translation (1) 		

Question		Indicative Content	Mark
Numbe	<u>r</u>		
QWC	*4(b)	A description including some of the following points in a logical sequence Points relating to DNA structural features: • 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 Contributions from Scientists: • 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	(6)
		 reference to using other people's ideas 	(6)
Level	0	No rewardable content	
1	1 - 2	 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	 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	 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)	An explanation to include two of the following points linked together • genes / base sequence (on human chromosome) identified (1)	Accept base pair sequence gene map	
	 identification of faulty / mutated genes (1) 	Accept idea that genes can be linked to disease	
	 people can be tested for a genetic disorder (1) 	Accept diagnosis of cancer	
	 ref to development of gene therapy (1) 	Accept a description of gene therapy	
	 idea that appropriate /early /personalised / genomic medication / counselling can be given (1) 		(2)