

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	<p><u>deoxyribose</u> (sugar) ; phosphate (group) ;</p> <p>(nitrogenous / purine or pyrimidine) base / one correctly named base ;</p>	3	<p>DO NOT CREDIT dioxribose</p> <p>DO NOT CREDIT phosphate head or phosphate backbone</p> <p>DO NOT CREDIT letter instead of named base</p> <p>DO NOT CREDIT uracil</p> <p>DO NOT CREDIT incorrect spelling of thymine with 'a'</p>
1	(a)	(ii)	<p>has ribose ;</p> <p>uracil / U, instead of, thymine / T ;</p> <p>single stranded ;</p> <p>3 forms / AW ;</p>	2 max	<p>assume answer refers to RNA unless otherwise stated</p> <p>DO NOT CREDIT incorrect spelling of thymine with 'a'</p>

Question		Expected Answers		Marks	Additional Guidance
1	(b)	1	untwist / unwind ;	6 max	1 DO NOT CREDIT unravel
		S	2 unzip / described ;		2 DO NOT CREDIT strands separating without qualification
S	3 H bond breaks ;				
	4 both strands act as template ;				
N	5 (aligning of) free (DNA) <u>nucleotides</u> ;	5 DO NOT CREDIT bases			
N	6 <u>complementary</u> , base / nucleotide, pairing ;	6 & 7 Do not consider for QWC if mark awarded in the context of breaking apart or DNA structure only, rather than forming new double helix			
N	7 C to G and T to A / purine to pyrimidine ;				
R	8 hydrogen bonds reform ;				
R	9 sugar-phosphate back bone forms ;				
R	10 (using) covalent / phosphodiester, bond ;				
	11 <u>semi-conservative</u> replication ;				
	12 DNA polymerase ;				
	13 AVP ;				
		QWC - correct sequence – 1 S mark, then 1 N mark, then 1 R mark ;	1	It should be clear that candidate realises that the sequence is S, then N then R – even if not written in that order DO NOT CREDIT if any ref to transcription / translation	

Question			Expected Answers	Marks	Additional Guidance
1	(c)	(i)	polypeptide / protein / primary structure / a sequence of amino acids ;	1	DO NOT CREDIT 'codes for an amino acid' IGNORE enzyme / named protein
1	(c)	(ii)	different, sequence of amino acids / primary structure / AW ; different protein / protein folds up differently / different tertiary structure ; (product) no longer functions / different function ;	2 max	DO NOT CREDIT 'product' or incorrect biochemical (e.g. carbohydrate) ACCEPT suitable example, e.g. active site of enzyme no longer complimentary to substrate
			Total	15	

Question			Answer	Mark	Guidance
2	(a)		characteristics / features / AW , are passed on to / inherited (by the next generation) ;	1	IGNORE genes / alleles / DNA as question asks about Darwin's conclusion ACCEPT 'appearance' for features DO NOT CREDIT answers that only refer to beneficial characteristics (as Darwin's other observations would need to be considered to arrive at this conclusion)
2	(b)		<p>1 B and C and D are <u>more</u> closely related (to each other than to A) ; ora</p> <p>2 <i>idea that</i> A is in different (taxonomic) group (from other 3) ; ora</p> <p>3 B and C and D , share more , <u>recent</u> common ancestor ;</p> <p>4 phylogeny / evolution , of B and C and D diverged at same point ; ora</p>	2 max	IGNORE references to relationship with organism (1) 1 IGNORE 'B, C and D are more similar' as this could refer to appearance rather than relationship 2 CREDIT named taxonomic group 3 IGNORE genes etc.
2	(c)		fits evidence ; <i>idea of</i> more , evidence / research (since nineteenth century) ;	1 max	CREDIT examples, e.g. DNA revolution / more fossils ACCEPT improved technology / molecular evidence IGNORE 'the theory has been proved' IGNORE Darwin provided more evidence ACCEPT <u>changes in</u> religious belief
2	(d)	(i)	code for (one or more) polypeptide(s) ;	1	ACCEPT protein IGNORE amino acid sequence

Question			Answer	Mark	Guidance
2	(d)	(ii)	<p>1 double stranded ;</p> <p>2 each / both (strands) act as <u>template</u> ;</p> <p>3 hydrogen bonds , <u>easily</u> , break / form , between bases ;</p> <p>4 <u>complementary</u> (specified) base , pairing / AW ;</p> <p>5 purine (only able to) bind to pyrimidine ;</p> <p>6 (due to) different sizes of purines and pyrimidines ;</p> <p>7 hydrogen bonding different between A & T and C & G or 3 H bonds between C & G and 2 H bonds between A & T ;</p>	5 max	<p>AWARD marks from clearly annotated diagram</p> <p>1 ACCEPT double helix or two , polynucleotides / strands / chains or antiparallel strands 1 IGNORE one old and one new strand</p> <p>2 IGNORE either NOTE 'there are 2 strands which act as templates' = 2 marks (mp 1 and 2)</p> <p>3 ACCEPT <u>weak</u> H bonds between bases break 3 IGNORE refs to H bonds , breaking / forming , without qualification that the bonds are weak or , form / break , easily</p> <p>4 IGNORE complementary nucleotides unless qualified with examples of base-pairing</p> <p>7 ACCEPT names of bases with phonetic spellings 7 DO NOT CREDIT thymine 7ACCEPT A=T and C≡G without reference to hydrogen bonds</p>

Question			Answer	Mark	Guidance
2	(e)	(i)	<u>speciation</u> ;	1	
2	(e)	(ii)	<i>idea that</i> different islands have different , selection pressures / habitats / environments / vacant niches ; ora <i>idea of</i> isolation ; ora	1 max	CREDIT ' the Galapagos have a wider range of habitats' IGNORE islands have different habitat(s) from the mainland e.g. the islands are separated from the mainland / no gene flow / geographic barrier / reproductive barrier ACCEPT allopatric (speciation) IGNORE sympatric IGNORE refs to succession or human habitat destruction on the mainland as the question is about evolution
Total				12	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	double helix ; anti-parallel ; sugar-phosphate ; hydrogen ;	4	
3	(b)	(i)		<p>mp 1 & 2 DO NOT CREDIT ref to a single organism mp 1 & 2 IGNORE ref to complementary DO NOT CREDIT statements in context of organism size e.g. statement that human has more A than <i>E. coli</i> / human has the most AT / <i>E. coli</i> has the most CG This mark is for a general statement</p> <p>e.g. human C = 19.8% <u>and</u> G = 19.9% human A = 30.9% <u>and</u> <i>E. coli</i> A = 24.7% 'human has more A (30.9%) than wheat (27.3%)' = 2 (mp 3 & 7)</p>
			3 max	

Question			Expected Answers	Marks	Additional Guidance
3	(b)	(ii)	(suggests) A , bonds / pairs / links / connects / joins , to T ; (suggests) C , bonds / pairs / links / connects / joins , to G ; (suggests) purine bonds to pyrimidine ; (evidence for) complementary base pairing / which bases pair with each other / base pairing rules ; suggests bases point 'inwards' rather than 'outwards' ;	2 max	IGNORE A – T or A = T unqualified IGNORE C – G or C = G unqualified ACCEPT 'bond' instead of 'pair'

Question		Expected Answers	Marks	Additional Guidance												
3	(c)	<p>Award 1 mark per correct row</p> <table border="1"> <thead> <tr> <th>feature</th> <th>DNA</th> <th>RNA</th> </tr> </thead> <tbody> <tr> <td>number of strands</td> <td>two / double</td> <td>one / single</td> </tr> <tr> <td>bases present</td> <td>thymine / T (+ adenine + cytosine + guanine)</td> <td>uracil / U (+ adenine + cytosine + guanine)</td> </tr> <tr> <td>sugar present</td> <td>deoxyribose</td> <td>ribose</td> </tr> </tbody> </table>	feature	DNA	RNA	number of strands	two / double	one / single	bases present	thymine / T (+ adenine + cytosine + guanine)	uracil / U (+ adenine + cytosine + guanine)	sugar present	deoxyribose	ribose	3	<p>If a choice of answers is given, do not credit unless both answers are valid (e.g. two and double strands for DNA / ribose and pentose sugar)</p> <hr/> <p>ACCEPT letters instead of names of bases Names of bases must be unambiguous, so DO NOT CREDIT adenosine / thiamine / cysteine / etc. If more bases mentioned than T and U, then all bases must be included</p> <hr/> <p>DO NOT CREDIT deoxyribose / oxyribose/ hexose / sugar IGNORE pentose</p>
feature	DNA	RNA														
number of strands	two / double	one / single														
bases present	thymine / T (+ adenine + cytosine + guanine)	uracil / U (+ adenine + cytosine + guanine)														
sugar present	deoxyribose	ribose														
3	(d)	<p>carries / transfers, the (complementary DNA) , code / <u>genetic</u> information / copy of gene ; out of the nucleus ; (transfers it) to the, ribosome / RER / site of translation ; for, protein / polypeptide, synthesis ;</p>	2 max	<p>IGNORE transcription DO NOT CREDIT ref to the <u>whole</u> DNA code / molecule</p> <p>ACCEPT 'to make protein'</p>												
Total			14													