



BIOLOGY MIND

Edexcel

A-Level

BIOLOGY

Biological Molecules

DNA & Protein Synthesis 4

Time allowed

52 minutes

MARK SCHEME



Score

/43

Percentage

%

Question Number	Answer	Additional guidance	Mark
1(a)	<ol style="list-style-type: none"> 1. idea that DNA (molecule){ unwinds / unzips / uncoils / eq} (DNA) strands separate ; 2. (RNA mono) nucleotides {line up against / attach to} {one strand / template / antisense strand / eq} / eq ; 3. ref to complementary base pairing (between DNA and mononucleotides) ; 4. ref to formation of phosphodiester bonds ; 5. ref to condensation reaction ; 6. correct name of enzyme involved ; 7. idea that mRNA detaches from the DNA; 	<ol style="list-style-type: none"> 1. AL W description e.g. breaking of hydrogen bonds 2. N DNA strands, DNA nucleotides 3. AL W description of complementary base pairing 6. (A) helicase, RNA polymerase, DNA ligase NOT DNA polymerase, polymerase 7. N leaves nucleus alone / eq 	(4)

Question Number	Answer	Mark
1(b)(i)	B ;	(1)

Question Number	Answer	Mark
1(b)(ii)	B ;	(1)

Question Number	Answer	Mark
1(b)(iii)	D ;	(1)



DNA & Protein Synthesis

Question Number	Answer	Additional guidance	Mark
1(c)	<p>1. tRNA is folded (and mRNA is {straight / unfolded}) / eq ;</p> <p>2. tRNA has hydrogen bonds (holding the structure together) (but the mRNA does not / eq) ;</p> <p>3. tRNA is a fixed {size / length} (but mRNA {is not / length depends on size of gene}) / eq ;</p> <p>4. tRNA has an anticodon (but mRNA has codons) ;</p> <p>5. tRNA has an amino acid binding site ;</p>	<p>1. IG RE double stranded / branched ALLOW tRNA clover shaped / looped</p> <p>2. ALLO tRNA has complementary base pairing / double stranded sections NOT (all) double stranded</p> <p>4. N is an anticodon</p>	(2)



Question Number	Answer	Mark
2(a)	B ;	(1)

Question Number	Answer	Mark
2(b)	C ;	(1)

Question Number	Answer	Mark
2(c)	D ;	(1)

Question Number	Answer	Mark
2(d)	B ;	(1)

Question Number	Answer	Mark
2(e)	B ;	(1)

Question Number	Answer	Mark
2(f)	C ;	(1)



Question Number	Answer	Mark
2(g)	<p>mRNA</p> <ol style="list-style-type: none"> 1. idea of mRNA being a copy of the { antisense DNA strand / template DNA strand / coding DNA strand / gene / allele / part of DNA / eq } ; 2. idea that mRNA {made up of codons / codes for specific amino acids / code for amino acid sequence / eq} ; 3. idea of mRNA being taken {into the cytoplasm / to the ribosomes / out of the nucleus / eq} ; 4. used in translation ; 5. binds to ribosome ; <p>tRNA</p> <ol style="list-style-type: none"> 6. (tRNA) {attaches to / transports / eq } (specific) amino acid / eq ; 7. idea that tRNA binds to mRNA / reference to anticodon codon interaction ; 8. idea that two tRNA bring amino acids together (for peptide bonds to be formed) ; 	(4)



Question Number	Answer	Mark
3(a)	<ol style="list-style-type: none"> 1. (Double-stranded because made of) two strands ; 2. (strands joined) by hydrogen bonds (between bases) ; 3. (polynucleotide) of {many / eq} nucleotides ; 4. (nucleotides) linked by phospho(di)ester bonds / eq ; 	(3)

Question Number	Answer	Mark
*3(b) QWC	<p>Take into account quality of written communication when awarding the following points.</p> <ol style="list-style-type: none"> 1. idea of sequence of bases {forming the genetic code / determines the amino acid sequence} ; 2. idea that one triplet codes for an amino acid; 3. ref to (DNA) acting as a template ; 4. reference to transcription OR detail of transcription e.g. DNA unzips, mRNA synthesis ; 5. idea that mRNA moves from nucleus to cytoplasm / eq ; 6. reference to translation OR detail of translation e.g. role of ribosome, codon-anticodon interaction ; 7. idea that tRNA carries an amino acid ; 8. ref to formation of peptide bonds between amino acids ; 9. idea that primary structure is the {sequence /order / eq} of amino acids ; 10. comment on post-transcriptional modification of mRNA (between transcription and translation)e.g. removal of introns, splicing ; 	(5)

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Question Number	Answer	Mark
4(a)	(DNA) { polymerase / helicase / ligase} ;	(1)

Question Number	Answer	Mark
4(b)	<p>Stage 1</p> <p>1. only one bond drawn in lower half of tube ;</p> <p>Stage 2</p> <p>2. one only bond drawn (higher than the one drawn in stage 1) ;</p> <p>Stage 3</p> <p>Diagram</p> <p>3. {1 / 2} molecules shown with one light and one heavy strand ;</p> <p>4. {1 / 2} molecules shown with two light strands;</p> <p>Test tube</p> <p>5. 2 bands shown in roughly correct position (middle to upper half of test tube) ;</p> <p>6. bands should be of (roughly) equal width ;</p> <p>[consequential error from stage 2 should apply for both marking points 5 and 6]</p>	(6)



Question Number	Answer	Mark
5(a)	<ol style="list-style-type: none"> 1. presence of amine group /eq ; 2. presence of carboxyl group / eq ; 3. reference to R group ; 4. reference to central carbon atom ; <p>[award marks on correctly drawn diagram]</p>	(2)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> 1. correct reference to transcription ; 2. DNA {unwinds / strands separate / eq} ; 3. (RNA) (mono)nucleotides {line up against / attach / eq} to one (DNA) { strand / template / eq} ; 4. reference to <u>complementary</u> base pairing (between DNA and (mono)nucleotides) ; 5. reference to {(mono)nucleotides joining together / formation of phosphodiester bonds} ; 6. correct reference to condensation reaction ; 7. correct reference to named enzymes involved / eq ; 8. mRNA detaches (from DNA) / eq ; 	(4)



Question Number	Answer	Mark
5(c)(i)	DISCOUNTED QUESTION / DO NOT MARK	(0)

Question Number	Answer	Mark
5(c)(ii)	B ;	(1)

Question Number	Answer	Mark
5(c)(iii)	D ;	(1)

