

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

Time allowed **58 Minutes** 

2002

Biology

**Mark Scheme** 

AQA AS & A LEVEL

Percentage

%

3.1 Biological molecules

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Score

/48



(b)

DNA strand	Percentage of each base			
	Α	С	G	т
Strand 1	(16)	34	21	29
Strand 2	29	(21)	(34)	16

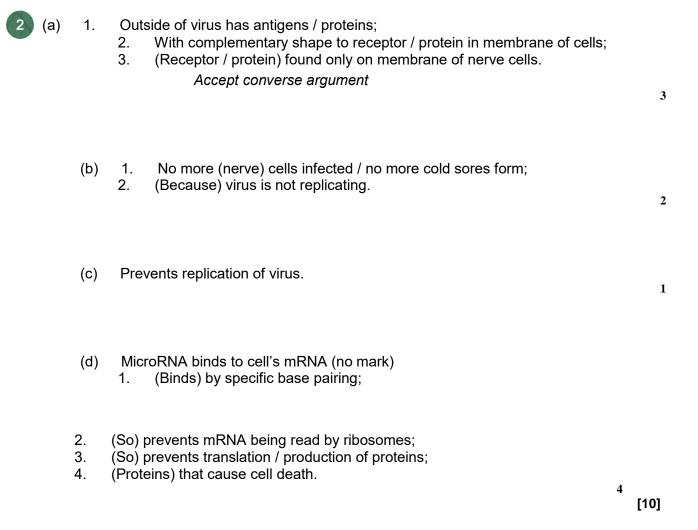
2 rows correct = 2 marks; 1 row correct = 1 mark.

- (c) 1. Reference to DNA polymerase;
  - 2. (Which is) specific;
  - 3. Only complementary with / binds to 5' end (of strand); Reject hydrogen bonds / base pairing
  - 4. Shapes of 5' end and 3' end are different / description of how different.

4

1







(a) (i) Repeating units / nucleotides / monomer / molecules; Allow more than one, but reject two

- (ii) 1. C = hydrogen bonds;
- 2. D = <u>deoxy</u>ribose; *Ignore sugar*
- 3. E = phosphate; Ignore phosphorus, Ignore molecule

(iii)

Name of base	Percentage
Thymine	34
Cytosine / Guanine	16
Adenine	34
Cytosine / Guanine	16

Spelling must be correct to gain MP1 First mark = names correct Second mark = % correct, with <u>adenine as 34%</u>

2

3

1



(b) (i) 153;

Some regions of the gene are non-coding / <u>introns</u> / start / stop code / triplet / there are two DNA strands;
 Allow <u>addition</u> mutation
 Ignore unqualified reference to mutation
 Accept reference to introns and exons if given together
 Ignore 'junk' DNA / multiple repeats

[8]

1





1. DNA replicated;

Reject: DNA replication in the wrong stage

- 2. (Involving) specific / accurate / complementary base-pairing; Accept: semi conservative replication
- 3. (Ref to) two identical / sister <u>chromatids;</u>
- 4. Each chromatid / moves / is separated to (opposite) poles / ends of cell. Reject: meiosis / homologous chromosomes / crossing over Note: sister <u>chromatids</u> move to opposite poles / ends = 2 marks for mp 3 and mp 4 Reject: events in wrong phase / stage
- (b) (i) 1. To allow (more) light through; Accept: transparent
  - 2. A single / few layer(s) of <u>cells</u> to be viewed. Accept: (thin) for better / easier stain penetration
  - (ii) 1. More / faster mitosis / division near tip / at 0.2 mm; Neutral: references to largest mitotic index
    - (Almost) no mitosis / division at / after 1.6 mm from tip; Accept: cell division for mitosis Penalise once for references to meiosis
    - (So) roots grow by mitosis / adding new cells to the tip.
      Accept: growth occurs at / near / just behind the tip (of the root)
      Accept: converse arguments

2 max

4



(a) Deoxyribose.

5

(b)	1.	Thymine 18 (%);
	2.	Guanine 32 (%).

(c) DNA polymerase.

1

2

1

- (d) 1. (**Figure 1** shows) DNA has antiparallel strands / described;
  - 2. (**Figure 1** shows) shape of the nucleotides is different / nucleotides aligned differently;
  - 3. Enzymes have active sites with specific shape;
  - 4. Only substrates with complementary shape / only the 3' end can bind with active site of enzyme / active site of DNA polymerase.

[8]



- (i) Joins nucleotides (to form new strand). (a) Accept: joins sugar and phosphate / forms sugar-phosphate backbone Reject: (DNA polymerase) forms base pairs / hydrogen bonds 1 (ii) (Prokaryotic DNA) Circular / non-linear (DNA); 1. Accept converse for eukaryotic DNA Ignore: references to nucleus, binary fission, strands and plasmids 2. Not (associated) with proteins / histones; Accept does not form chromosomes / chromatin 3. No introns / no non-coding DNA. Accept only exons **Q** Neutral: no 'junk' DNA 2 max (b) (i) Have different genes; 1. Reject: different alleles 2. (Sobases / triplets) are in a different sequence / order; Accept: base sequence that matters, not percentage 3. (So) different amino acid (sequence / coded for) / different protein / different polypeptide / different enzyme. Unqualified 'different amino acids' does not gain a mark Reject: references to different amino acids formed Ignore: references to mutations / exons / non-coding / introns 2 max (Virus DNA) (ii) A does not equal T / G does not equal C; 1. Accept: similar for equal Accept: virus has more C than G / has more A than T 2. (So) no base pairing;
  - 3. (So) DNA is not double stranded / is single stranded.

[7]

2 max