

- M1.(a)** (i) Joins nucleotides (to form new strand).
Accept: joins sugar and phosphate / forms sugar-phosphate backbone
Reject: (DNA polymerase) forms base pairs / hydrogen bonds

1

- (ii) (Prokaryotic DNA)
1. Circular / non-linear (DNA);
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)
1. Have different genes;
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

- (ii) (Virus DNA)
1. A does not equal T / G does not equal C;
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.

2 max

[7]

M2.(a) 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 chromatids;

4. Each chromatid / moves / is separated to (opposite) poles / ends of cell.

Reject: meiosis / homologous chromosomes / crossing over

Note: sister chromatids move to opposite poles / ends = 2 marks for mp 3 and mp 4

Reject: events in wrong phase / stage

4

(b) (i) 1. To allow (more) light through;

Accept: transparent

2. A single / few layer(s) of cells to be viewed.

Accept: (thin) for better / easier stain penetration

2

(ii) 1. More / faster mitosis / division near tip / at 0.2 mm;

Neutral: references to largest mitotic index

2. (Almost) no mitosis / division at / after 1.6 mm from tip;

Accept: cell division for mitosis

Penalise once for references to meiosis

3. (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

[8]

M3.(a) Deoxyribose. 1

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

(c) DNA polymerase. 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. 4

[8]

M4.(a) 1. Outside of virus has antigens / proteins;
2. With complementary shape to receptor / protein in membrane of cells;
3. (Receptor / protein) found only on membrane of nerve cells.
Accept converse argument 3

(b) 1. No more (nerve) cells infected / no more cold sores form;
2. (Because) virus is not replicating. 2

(c) Prevents replication of virus. 1

(d) MicroRNA binds to cell's mRNA (no mark)
1. (Binds) by specific base pairing;

2. (So) prevents mRNA being read by ribosomes;
3. (So) prevents translation / production of proteins;
4. (Proteins) that cause cell death.

4
[10]

M5.(a) Box around single nucleotide.

1

(b)

DNA strand	Percentage of each base			
	A	C	G	T
Strand 1	(16)	34	21	29
Strand 2	29	(21)	(34)	16

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

2

- (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
[7]

M6.(a) (i) Repeating units / nucleotides / monomer / molecules;
Allow more than one, but reject two

1

- (ii) 1. C = hydrogen bonds;

2. D = deoxyribose;
Ignore sugar
3. E = phosphate;
Ignore phosphorus, Ignore molecule

3

(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 adenine as 34%

2

(b) (i) 153;

1

(ii) Some regions of the gene are non-coding / introns / start / stop code / triplet / there are two DNA strands;

Allow addition mutation

Ignore unqualified reference to mutation

Accept reference to introns and exons if given together

Ignore 'junk' DNA / multiple repeats

1

[8]