

APOLLO

Nucleic acids

SL

Biology

First assessment 2025

9 questions | mark schemes

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ3 | Q2 | 1 marks

2. B

Biology SL | Paper 1A | May 2025 TZ3 | Q7 | 1 marks

7. A

4.	a	a. somatic cells because all chromosome numbers are even; b. somatic cells have full/two sets of chromosomes / diploid/2n; c. somatic cells because the <u>diploid/2n</u> number of humans is 46;	c. accept other examples	1 max
4.	b	by length/ centromere position/banding pattern;	Accept size Do not accept shape	1
4.	c	coiling/condensing of chromosomes/DNA (for cell division/mitosis/meiosis);	OWTTE Do not accept references to stability or structure.	1
4.	d	(They may be positively correlated because:) a. bees may be the least complex animal species and have the smallest genome size (among the animals shown in the table) OR humans may be the most complex animal species and have the largest genome size (among the animals shown in the table); (They may not be positively correlated because:) b. <i>P.japonica</i> / <i>P.sylvestris</i> /the two plant species have a much larger genome than the animal species but they are possibly less complex organisms OR humans may be the most complex species, however have a smaller genome than the two plant species; c. complexity is not defined / is subjective / insufficient data in the table;		2 max

1.	a	36 million/36 000 000/36 mbp;	<i>Do not accept just 36 without million or mbp.</i>	1
1.	b	a. nucleus; b. mitochondria; c. chloroplast/plastids/other named plastid type; d. ribosome;		1 max
1.	c	a. increasing speed/decreasing costs make it useful for sequencing any species; b. allows to determine evolutionary relationships/common ancestors/OWTTE OR provides evidence for evolution OR allows to classify/identify species/OWTTE; c. makes it easier to conserve/protect biodiversity OR helps to restore endangered/extinct species; d. allows to develop personalized medicine/specialized medicine for an individual patient/OWTTE; e. allows for the prevention/identification/treatment of diseases/named disease OR allows to detect mutations/predisposition towards disease; f. allows for genetic modification/editing/OWTTE;	<i>Do not accept reference to paternity testing, forensic investigations and cloning.</i> <i>b. Do not accept naming/comparing/ distinguishing between species.</i> <i>d. Do not accept specialized medicine on its own, without a reference to individual patients.</i> <i>e. Do not accept "identify cause of mutations" and "mutations in the genetic code".</i>	3 max

Question	Answers	Notes	Total
----------	---------	-------	-------

5.	a	nucleotide(s);		1
5.	b	a. DNA is double stranded, and RNA is single stranded; b. DNA contains the sugar deoxyribose and RNA contains ribose; c. DNA contains thymine and RNA contains uracil; d. DNA is a long molecule and RNA is much shorter;	<i>Both contrasting statements about the point being considered need be given to obtain one mark</i>	2 max
5.	c	a. phenotype is the appearance of a genotype; b. a genotype may be homozygous/TT, tt or heterozygous/Tt / <i>OWTTE</i> ; c. dominant alleles mask/hide the presence of the recessive allele OR dominant alleles show their effects / are expressed with the presence of one single dominant allele (in a genotype) / Tt and TT both show dominant trait/phenotype; d. genotype tt / homozygous recessive shows recessive trait/phenotype OR absence of a dominant allele shows recessive trait/phenotype; e. if the recessive allele is sex linked, only one allele is present in males and will be expressed;	<i>Answers may be shown in an annotated Punnett Grid</i>	3 max

2.	a	a. DNA has complementary base pairs; b. cytosine pairs with guanine therefore 35.2 % is % of cytosine and guanine; c. adenine pairs with thymine so (100 – 35.2) 64.8 % is adenine and thymine (and half of this is thymine 32.4%);	<i>Allow A, T, C, G instead of names of bases.</i> <i>Accept alternative numerical calculations e.g. use 50% as the base (i.e. C and T must be 50%).</i>	2 max
2.	b	polymerase chain reaction;	<i>Accept PCR.</i>	1
2.	c	a. DNA contains deoxyribose and RNA contains ribose; b. DNA contains thymine and RNA contains uracil;	<i>For a. accept 'DNA contains deoxyribonucleotides and RNA contains ribonucleotides'.</i> <i>Full names of bases must be used for credit.</i>	2

Question	Answers	Notes	Total
----------	---------	-------	-------

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q14 | 1 marks

14. D

Biology SL | Paper 1A | Specimen 2025 | Q16 | 1 marks

16. A

3.	b		a. can be used to explain the structure/dimensions of the molecule; b. (complementary base pairing means) adenine always with thymine AND cytosine always with guanine; c. ensures continuity of genetic information results from replication; d. stable arrangement of antiparallel strands; e. complementary base pairing provides a guide for (reliable) DNA transcription;	Accept A, T, C and G	3
3.	c		a. in prokaryotes circular whereas in eukaryotes linear; b. in eukaryotes associates with histones whereas in (most) prokaryotes not/naked DNA in prokaryotes;	Allow "in eukaryotes forms nucleosomes whereas in prokaryotes not" as this is HL only	2

Question	Answers	Notes	Total
----------	---------	-------	-------