

APOLLO

Biology

SL Answers

First assessment 2025

Whole questions arranged by syllabus topic.

Original question and scheme crops preserve source diagrams.

APOLLO

Water

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q1 | 1 marks

1. B

Biology SL | Paper 1A | May 2025 TZ2 | Q1 | 1 marks

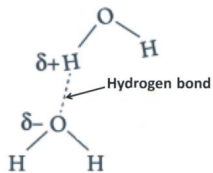
1. D

Biology SL | Paper 1A | May 2025 TZ3 | Q1 | 1 marks

1. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q1 | 1 marks

1. B

7.	a	a. (at least) two water molecules drawn that each show three atoms joined by single covalent bonds (H–O–H); b. V-shaped arrangement of water molecule(s); c. dashes or dots that join water molecules between O on one molecule and H on another; d. labelled 'hydrogen / H bond' shown joining a hydrogen of one molecule and the oxygen of another; e. delta/δ + and delta/δ - signs on both O and H to indicate polarity of the molecule as shown in the notes;	<i>Example:</i>  [Source: © International Baccalaureate Organization 2025] <i>For e. the idea of partial charge in description is acceptable.</i>	4 max
7.	b	a. pure water is hypotonic/lower solute concentration/more dilute to the cell/ more water molecules per volume; b. water enters the cells by <u>osmosis</u>; c. moves through aquaporins/through cell membrane; d. swelling/lysis/bursting/increasing size/increased activity pumping water out (contractile vacuoles) of animal cell; e. swelling/increased turgidity/develop turgor pressure in plant cell; f. <u>plant</u> cells wall resists/prevents bursting / withstands (turgor) pressure;	<i>Ignore references to water potential.</i> <i>For d. and e. in each case it must clear what kind of cell is being referred to animal or plant.</i> <i>For f. allow OWTTE.</i>	4 max

Question		Answers	Notes	Total
7.	c	MAX 5 for transpiration (marking points a,b,c,d,e,f,g,h) a. transpiration is the loss of water from (the surface of) the leaf / through stomata; b. loss of water by evaporation from cell walls in leaf cells causes water to be drawn from neighbouring/other cells; c. lost water drawn out of the <u>xylem</u>/creates transpirational pull; d. transpiration pull/tension draws water <u>up</u> the xylem; e. cohesion is <u>hydrogen</u> bonding between water molecules; f. cohesion (of water molecules) ensures a continuous column of water; g. adhesion of water is (hydrogen bonding) between water and other polar molecules; h. (adhesion is involved) in capillary action in soil/in plant cell walls/lignin; Max 3 for xylem adaptation (for marking points i,j,k,l) i. xylem (vessels) lack cell contents for unimpeded flow; j. xylem (vessels) have lignified walls to withstand tensions; k. xylem (vessels) have incomplete or absent end walls for unimpeded flow; l. xylem (vessels) have pits/pores/gaps for entry and exit of water;	<i>For i. Look for descriptions of structures or lack of structures, do not credit the cell is dead alone as this is not a functional adaptation.</i>	7 max

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q2 | 1 marks

2. C

APOLLO

Nucleic acids

9 questions

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
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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
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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
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APOLLO

Cell structure

5 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ3 | Q9 | 1 marks

9. D

1.	a	x400 / 400x / 400;	Accept answers from x380 to x420	1
1.	b	(eye piece) graticule;		1
1.	c	a. nucleus drawn that clearly shows 2 membranes and pores passing through both membranes; <i>Labels (Max 2 marks for labels):</i> b. (inner/ outer) nuclear membrane / nuclear envelope / double/two membrane; c. (nuclear) pore; d. nucleolus; e. chromatin/nucleoplasm/DNA/chromosomes/genetic material;	Accept drawings inside cells. a. Award even if no internal structures are drawn. Award one mark for diagram, then up to 2 maximum for labels.	3 max

Question	Answers	Notes	Total
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1.	a		(eyepiece) graticule;		1
1.	b	i	42.5 μm OR 45 μm ;	Accept any value within the range: 42 to 45 μm ; Unit required.	1
1.	b	ii	1000 $\pm$ 200 (x);	Accept any value within the range 800 to 1200. Allow ECF, but working must be shown and it must be around 45 mm divided by the result of 1bi.	1

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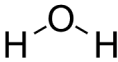
8825 – 6023M

1.	c	a. both have cytoplasm OR both have ribosomes OR both have (plasma/cell) membrane OR both have DNA/genetic material; b. <table><tr><th>Eukaryotic cells</th><th>Prokaryotic cells</th></tr><tr><td>have 80s/bigger ribosomes</td><td>have 70s/smaller ribosomes</td></tr><tr><td colspan="2">OR</td></tr><tr><td>have (DNA in) a nucleus / nuclear membrane</td><td>have nucleoid/DNA free in the cytoplasm / lack a nucleus</td></tr><tr><td colspan="2">OR</td></tr><tr><td>are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle</td><td>are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle</td></tr><tr><td colspan="2">OR</td></tr><tr><td>have proteins/histones associated with DNA</td><td>have no proteins/histones / have naked DNA</td></tr><tr><td colspan="2">OR</td></tr><tr><td>have linear chromosomes/DNA</td><td>have circular chromosomes/(loops of) DNA;</td></tr></table>	Eukaryotic cells	Prokaryotic cells	have 80s/bigger ribosomes	have 70s/smaller ribosomes	OR		have (DNA in) a nucleus / nuclear membrane	have nucleoid/DNA free in the cytoplasm / lack a nucleus	OR		are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle	are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle	OR		have proteins/histones associated with DNA	have no proteins/histones / have naked DNA	OR		have linear chromosomes/DNA	have circular chromosomes/(loops of) DNA;	Features common to all eukaryotes and all prokaryotes are needed, so reject reference to cell walls, pili and flagella. Award both marks if a similarity is implicit in the comparison, e.g. 'eukaryotic cells have bigger ribosomes than prokaryotic cells' or 'eukaryotes have DNA in the nucleus and prokaryotes free in the cytoplasm'. If more than one similarity or difference is given, award the mark even if one of them is incorrect unless there's a contradiction. b. Correct reference to both eukaryotic and prokaryotic cells for the same cell component or a comparative word required for the mark, e.g. 'eukaryotes have larger ribosomes' or 'only eukaryotes have the nucleus'.	2 max
Eukaryotic cells	Prokaryotic cells																							
have 80s/bigger ribosomes	have 70s/smaller ribosomes																							
OR																								
have (DNA in) a nucleus / nuclear membrane	have nucleoid/DNA free in the cytoplasm / lack a nucleus																							
OR																								
are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle	are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle																							
OR																								
have proteins/histones associated with DNA	have no proteins/histones / have naked DNA																							
OR																								
have linear chromosomes/DNA	have circular chromosomes/(loops of) DNA;																							

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8825 – 6023M

Question	Answers	Notes	Total
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3.	a	a. mitochondria/lysosome; b. approximate size relative to other organelles; c. shape is correct (other membrane-bound organelles/ER/Golgi have a different shape);	<i>a. Is for the organelle and additional marking points are for reasons.</i> <i>a. Accept the first answer given if a list is provided by the answer.</i>	2 max
3.	b	eukaryotic because there are nuclei/membrane-bound organelles/compartimentalized organelles;		1
3.	c	chitin/glycoprotein/glucans;	<i>Do not accept cellulose</i>	1
3.	d	aseptate/not divided up into cells/more than one nucleus (in the cell);	<i>Accept the first answer given.</i>	1
3.	e	a. two hydrogens and one oxygen; b. (2 hydrogen and 1 oxygen) linked by single lines to represent bonds placed at an angle;		2

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q11 | 1 marks

11. A

APOLLO

Diversity of organisms

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q8 | 1 marks

8. C

Biology SL | Paper 1A | May 2025 TZ3 | Q25 | 1 marks

25. A

2.	a	a group of organisms that (share traits and) can breed/interbreed/sexually reproduce and produce <u>fertile</u> offspring;		1
2.	b	a. the number/type/size of chromosomes can be investigated/ deduced through karyotyping; OR species have a characteristic number of chromosomes OR chromosomes are classified/identified by banding, length and position of centromere; b. individuals/dogs with the same number and type/size of chromosomes (probably) belong to the same species;	<i>Allow converse for marking point b.</i>	2

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q13 | 1 marks

13. C

Biology SL | Paper 1A | Nov 2025 TZ1 | Q25 | 1 marks

25. D

4.	a		<i>Poecilia</i>		1
4.	b		group of organisms with (visible) shared traits		1
4.	c	i	a. same population, as the fish have similar body morphology OR same population, as colour variation could be normal within the population; b. different population, as the fish show variety in pattern/colour;		1
4.	c	ii	a. observe (courtship/mating) behaviour when they are together; b. carry out DNA analysis; c. gather information about reproductive isolation;		2
4.	d		a. sexual selection / OWTTE; b. camouflage;		1

APOLLO

Evolution and speciation

10 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q22 | 1 marks

22. B

Biology SL | Paper 1A | May 2025 TZ2 | Q22 | 1 marks

22. C

Biology SL | Paper 1A | May 2025 TZ3 | Q14 | 1 marks

14. C

Biology SL | Paper 1A | May 2025 TZ3 | Q23 | 1 marks

23. A

3.	a	a. prioritizes globally endangered species for conservation; b. identifies species that have few close relatives/evolutionarily distinct; c. species recognised at a grassroots level/ program is run at a local level WTTE/Important for maintaining <u>biodiversity</u>; d. named relevant example of a species or EDGE program;	d. Examples may include <i>Chinese Giant Salamander (Andrias davidianus)/Pangolins (e.g., Sunda Pangolin Manis javanica)/ Aye-aye (Daubentonia madagascariensis)</i> <i>But any other correct and verified example is allowed</i>	2 max
3.	b	a. (later) rise in water level led to <u>geographical/geographic</u> isolation; b. reproductive isolation / no interbreeding (because of barrier) / no gene flow (between populations); c. different selective pressures/environments (for each population); d. different adaptations favoured/survive and reproduce more / differential selection/natural selection (for each population); e. populations diverge/can no longer interbreed (even when barrier is removed);	d. Must refer to adaptations and the action i.e. survive and reproduce.	3 max

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2225 – 6024

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q22 | 1 marks

22. B

Biology SL | Paper 1A | Nov 2025 TZ1 | Q24 | 1 marks

24. A

Biology SL | Paper 1A | Nov 2025 TZ3 | Q13 | 1 marks

13. D

Biology SL | Paper 1A | Specimen 2025 | Q23 | 1 marks

23. B

Biology SL | Paper 1A | Specimen 2025 | Q24 | 1 marks

24. C

APOLLO

Conservation of biodiversity

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q23 | 1 marks

23. D

Biology SL | Paper 1A | May 2025 TZ2 | Q23 | 1 marks

23. B

Biology SL | Paper 1A | May 2025 TZ3 | Q29 | 1 marks

29. C

Biology SL | Paper 1A | Nov 2025 TZ1 | Q23 | 1 marks

23. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q22 | 1 marks

22. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q23 | 1 marks

23. A

APOLLO

Carbohydrates and lipids

10 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q2 | 1 marks

2. A

Biology SL | Paper 1A | May 2025 TZ1 | Q3 | 1 marks

3. D

Biology SL | Paper 1A | May 2025 TZ2 | Q2 | 1 marks

2. A

Biology SL | Paper 1A | May 2025 TZ3 | Q3 | 1 marks

3. A

2.	a		condensation;		1
2.	b		glycerol;		1
2.	c		(cis/mono) unsaturated;		1
2.	d		a. stable/not so readily metabolised so energy not (easily) lost/released; b. insoluble/do not mix with water so no osmotic effect/does not affect water potential/water does not enter cells; c. insoluble/large/nonpolar molecule so transport is difficult/hard; d. large molecule/long chains/many C-H bonds so can store lots of energy OR twice as much energy can be stored/released (per g) compared to carbohydrate;		2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q2 | 1 marks

2. B

Biology SL | Paper 1A | Specimen 2025 | Q1 | 1 marks

1. C

Biology SL | Paper 1A | Specimen 2025 | Q3 | 1 marks

3. B

1.	a	i	Breakfast cereals		1
1.	a	ii	12%	Allow 11 – 13	1
1.	b		<i>Similarity</i> e.g. a. both groups get most of their fibre from bread OR both get least from other sources OR both have similar % from vegetables. <i>Do not accept "amounts"</i> OR both have similar sources / show a similar pattern; <i>Difference</i> e.g. b. high gets bigger % from fruit etc.;	<i>For differences allow any answer where the % are different so long as the candidates state which is bigger/smaller.</i>	2
1.	c		a. the data shows % of their daily intake, not quantities they take in; b. although the graph shows the low group takes in a higher percentage of grains, it may be a higher percentage of a small amount / OWTTE;		2
1.	d		a. bread/fruit; b. it makes up a higher percentage of high-fibre diets than low-fibre diets;		2
1.	e		increasing fibre intake increases total energy intake and lowers the percentage of energy from fat		1

(continued...)

(Question 1 continued)

Question			Answers	Notes	Total
1.	f		the foods containing fibre must have energy rich molecules/carbohydrates in it		1
1.	g		<i>The study does support the hypothesis:</i> a. the data shows those with high fibre have more energy (required for growth and development/meeting daily needs); b. children with high fibre diets eat less fat (and less chance of heart disease/obesity);		1

Question	Answers	Notes	Total
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4.	a		(beta-) glucose		1
4.	b		a. stable (covalent) bonds between monomers ensure that the molecule is strong/rigid/inelastic; b. absence of branching allows fibres to pack closely/form hydrogen bonds; c. cross linkages/hydrogen bonds provide strength/stability/resists digestion; d. chain molecules allow for structure / strength; e. (beta-) glucose molecules provide energy (to organisms that can digest cellulose);		3

APOLLO

Proteins

4 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ2 | Q3 | 1 marks

3. D

Biology SL | Paper 1A | May 2025 TZ3 | Q4 | 1 marks

4. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q3 | 1 marks

3. D

Biology SL | Paper 1A | Specimen 2025 | Q4 | 1 marks

4. B

APOLLO

Membranes and membrane transport

10 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q9 | 1 marks

9. A

Biology SL | Paper 1A | May 2025 TZ2 | Q9 | 1 marks

9. A

Biology SL | Paper 1A | May 2025 TZ3 | Q10 | 1 marks

10. A

2.	a		into the cell/cytoplasm / in / inwards;		1
2.	b	i	a. with aquaporin mRNA more water enters cells / has a larger relative volume / grow more / become bigger / water enters faster / more osmosis occurs OR with aquaporin mRNA, volume (continually) increases but the control does not / remains stable / reaches equilibrium; b. with aquaporin mRNA, egg cells burst but not with control;	<i>Accept vice versa. a. Must use a comparative word such as larger, faster, more, bigger but do not accept numbers only.</i>	2
2.	b	ii	a. aquaporins increases permeability of plasma/cell membranes to water OR (aquaporins) allows faster/easier movement/diffusion of water molecules OR (aquaporins) increase rate of osmosis / facilitated diffusion; b. water moves from hypotonic solution outside cell into (egg) cells due to differences in solute concentration OR allow water to move down or along a concentration gradient;	<i>a. Answer should be qualified e.g. a reference to 'faster/more/increase/facilitate needed.</i>	2
2.	c		eggs will be of different initial volumes/sizes/shape;	<i>OWTTE Answers should include both the idea of different and initial/starting/beginning volume. Ignore fair test or fair comparison.</i>	1
2.	d		the investigation is reliable as it was repeated 10 times / there were multiple trials/readings OR the investigation is not reliable as there were not enough trials / 10 trials may not be enough OR reliability cannot be assessed as no error bars / standard deviation;		1

Question	Answers	Notes	Total
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4.	a	hydrolysis/catabolic reaction;		1
4.	b	a. branching of capillaries gives a large total surface area for exchange OR capillaries are numerous so every cell is close enough to allow rapid exchange of material/monosaccharides OR capillaries beds are dense increasing surface area for exchange; b. thin/one cell thick <u>walls</u> facilitate diffusion/exchange of materials/monosaccharides; c. fenestrations/larger openings/pores between capillary cells (for more rapid movement) for exchange of material/monosaccharides;		2 max
4.	c	a. movement of material/fructose from an area of high concentration to low/with the concentration gradient; b. does not require (ATP) energy/is passive; c. requires channel/integral proteins; d. channel proteins make membrane selectively permeable;	<i>c. Do not accepts carrier protein, pumps or any protein that requires ATP to function</i>	2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q3 | 1 marks

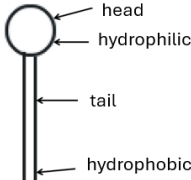
3. C

Biology SL | Paper 1A | Nov 2025 TZ1 | Q9 | 1 marks

9. B

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

2. A

3.	a	proteins/glycoproteins/glycolipids are found throughout the phospholipids;	OWTTE <i>It must be clear that the molecules are embedded/ included in the layer. Names of molecules alone are not enough for the mark.</i>	1
3.	b	a. full structure of the phospholipid labelled i.e. head/phosphate AND tail/fatty acid/lipid AND the drawing must have two fatty acids; b. head labelled as hydrophilic/mixes with water AND at least one of the two tails labelled as hydrophobic/doesn't mix with water;	Example:  Accept labels from marking points a. and b. on the diagram. If a plasma membrane with the correct phospholipid structure labelled correctly is acceptable.	2

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8825 – 6024M

Question			Answers	Notes	Total
3.	c		a. diffusion will occur if (oxygen) concentrations inside and outside the cell are different / there is a concentration gradient; b. increased concentration of oxygen outside of cell will increase rate of uptake/net movement into the cell / the higher the concentration gradient the faster the rate of uptake; c. no more net movement when oxygen concentrations are equal inside and outside the cell OR eventually a plateau in concentration will occur/concentrations reach an equilibrium;	<i>b. accept converse.</i> <i>b. refers to rate of diffusion, and not to direction of movement</i>	3

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8825 – 6024M

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q12 | 1 marks

12. C

APOLLO

Organelles and compartmentalization

3 questions

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q8 | 1 marks

8. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q10 | 1 marks

10. B

2.	a		a. nucleus; b. mitochondria; c. Golgi apparatus; d. ER/rough ER; e. smooth ER; f. vacuole/vesicle;		2
2.	b	i	a. chloroplasts; b. large/central vacuole;		1
2.	b	ii	a. plasma membrane; b. ribosomes;		1

3	a		a. double stranded; b. thymine/T present / uracil/U absent; c. 1:1 A:T and C:G;		2
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APOLLO

Cell specialization

9 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q10 | 1 marks

10. A

Biology SL | Paper 1A | May 2025 TZ2 | Q10 | 1 marks

10. A

Biology SL | Paper 1A | May 2025 TZ3 | Q11 | 1 marks

11. B

Biology SL | Paper 1A | May 2025 TZ3 | Q15 | 1 marks

15. D

Biology SL | Paper 1A | Nov 2025 TZ1 | Q10 | 1 marks

10. A

Biology SL | Paper 1A | Nov 2025 TZ1 | Q14 | 1 marks

14. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q8 | 1 marks

8. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q9 | 1 marks

9. B

Biology SL | Paper 1A | Specimen 2025 | Q10 | 1 marks

10. B

APOLLO

Gas exchange

5 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q14 | 1 marks

14. C

Biology SL | Paper 1A | May 2025 TZ2 | Q13 | 1 marks

13. A

Biology SL | Paper 1A | May 2025 TZ3 | Q16 | 1 marks

16. A

4.	a	a. diaphragm flattens OR volume inside the thorax/chest increases; b. pressure inside the thorax/chest/lungs decreases (below atmospheric pressure); c. air enters lungs to equalise the pressure OR air enters lungs moving from high to low pressure;	<i>For c. do not accept just "air enters the lungs" without an explanation.</i>	2 max
4.	b	(external) intercostal (muscles);	<i>Do not accept "internal" intercostal muscles. If the answer refers to both "internal and external" intercostal muscles (without any clarification on the role of each), then it is considered a contradiction, award no marking point.</i>	1

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8825 – 6024M

Question		Answers	Notes	Total
4.	c	a. moistens the inside wall/surface of the <u>alveoli</u> (for gas exchange); b. reduces surface tension (inside alveoli); c. prevents (alveoli) walls/surfaces sticking together OR helps to prevent collapse of the lungs; d. enhances (alveolar) expansion of lungs OR allows the inflation of lungs after birth;	<i>For c. (second strand) accept alveoli.</i>	2 max

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8825 – 6024M

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q17 | 1 marks

17. D

APOLLO

Transport

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q15 | 1 marks

15. D

Biology SL | Paper 1A | May 2025 TZ2 | Q14 | 1 marks

14. C

7.	a	a. each/one chromosome consists of (two genetically) identical chromatids OR sister chromatids are (genetically) identical OR replication (in interphase/S phase) produces two (genetically) identical DNA strands OR diploid cells contain two (genetically) identical copies of DNA; b. (DNA) condense/coil (in prophase) to form chromosomes OR (chromosomes/chromatids) attach to spindle fibres (in metaphase) OR (chromosomes/chromatids) align/place in the center/equator of the cell (in metaphase); c. microtubules contract/shorten OR (chromatids/chromosomes) are separated/pulled apart (in anaphase); d. (chromatids/chromosomes) move to/reach poles/ends of cell (in telophase) OR one (copy of each identical) chromatid/chromosome in each new/daughter cell;		4 max
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2225 – 6024

Question			Answers	Notes	Total
7.	b		a. <u>RNA polymerase</u> unwinds/unzips DNA / breaks hydrogen bonds; b. (DNA) template/antisense strand is used; c. (free) RNA nucleotides added (to DNA); d. (by) <u>complementary</u> base pairing / A-U AND G-C; e. RNA polymerase joins/attaches (RNA) nucleotides (on new mRNA strand)/forms (phosphodiester) bonds; f. RNA polymerase/mRNA strand detaches/DNA strands reattach OR RNA polymerase reach the stop codon;		4 max

Question			Answers	Notes	Total
7.	c		a. arteries carry blood at high pressure AND veins carry blood at low pressure; Arteries b. narrow/small lumen to maintain high (blood) pressure; c. thick/outer layer/wall for strength/protection/support/withstands high pressure OR collagen in outer layer/wall for strength/ support/protection; d. muscle tissue to withstand high (blood) pressure/control diameter; e. elastic tissue/fibers that stretch AND recoil/spring back OR elastic tissue/fibers withstand/maintain (high) pressure/smooth out blood flow/allow blood to flow in pulses; Veins f. contain (pocket) valves to prevent backflow (of blood); g. thin/flexible walls that can be squeezed/flattened/compressed by (skeletal) muscle OR compression of thin/flexible walls assists flow/movement of blood; h. large lumen so less resistance to blood flow; Common i. smooth endothelium/lining to reduce friction/increase blood flow;		7 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q15 | 1 marks

15. A

Biology SL | Paper 1A | Nov 2025 TZ3 | Q14 | 1 marks

14. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q15 | 1 marks

15. A

Biology SL | Paper 1A | Specimen 2025 | Q18 | 1 marks

18. D

APOLLO

Adaptation to environment

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ3 | Q24 | 1 marks

24. C

1.	a		any guard cell correctly labelled;	<i>Line must touch part of guard cell. Do not allow a circle around the whole stoma.</i>	1
1.	b		magnification of both lenses multiplied together (eyepiece/ocular and objective lens);		1
1.	c	i	(count) number of stomata (within field of view / image) AND divide by the area / field of view;		1
1.	c	ii	repeat with other areas of cast/leaf AND calculate the mean/average OR repeat/replicate with more leaves AND calculate the mean/average;		1 max
1.	d		a. aerial/upwards/vertical roots/pneumatophores / lenticels/pores; b. for gas exchange/respiration; ALTERNATIVE 1 c. thick impermeable outer layer/suberin; d. reduce salt absorption; ALTERNATIVE 2 e. (root) cells can accumulate solutes; f. reduce water loss due to osmosis/dehydration; ALTERNATIVE 3 g. buttress/prop/stilt roots; h. increase stability in swampy/muddy soils;	<i>Max 1 mark for correct feature or explanation alone. Explanation must match adaptation for 2 marks.</i> <i>a: Accept surface roots or roots out of the water.</i> <i>e: Accept reverse osmosis.</i> <i>g: Do not accept deep/long/tangled roots.</i>	2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q1 | 1 marks

1. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q21 | 1 marks

21. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q24 | 1 marks

24. D

Apollo | Original source crop | 64

Question			Answers	Notes	Total
1.	f		a. group 1 because there is less gap between T_{opt} and T_{max} OR group 1 is more likely to be adversely affected by increase in soil temperature because they have a narrow range of tolerance for higher temperatures than in group 2; b. group 1 because T_{max} is lower in most species; c. if global warming heats up the soil temperature, the seeds will germinate earlier which may be adverse (in either group); d. group 2 because T_{opt} is (generally) lower (than group 1); e. however, some species in group 2 have as low a T_{max} as group 1, therefore some species in group 2 will be adversely affected; f. species (regardless of group) may be adversely affected because increasing soil temperature means less water available for germination;		2 max

Question	Answers	Notes	Total
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7.	a	a. evolution occurs by natural selection; b. analogous structures come from convergent evolution; c. analogous structures have similar functions or structures evolved from different ancestry; d. similar conditions/environments have similar selective pressures favouring similar adaptations; e. similar functions/functional requirements result in similar adaptations/structures; f. e. g. torpedo shaped body in sharks and whales to facilitate swimming/ another verified example;	4 max
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8825 – 6012M

7.	b	a. wide-spreading roots allow water collected from large area; b. water storage tissue/thick leaves/stem survival during (long) droughts/periods without rainfall; c. deep roots to collect water from greater depths/underground sources; d. vertical stems to reduce exposure to sun at midday/heating when the sun is overhead/hottest OR pleated stems to allow shrinkage and reswelling/to store water; e. few stomata transpiration reduced/minimizes; f. waxy cuticle conserves water; g. stomata open at night reduces transpiration; h. no leaves/narrow leaves/leaves as spines/scales decreases surface area/reduces stomata/transpiration/water loss; i. rolled leaves/hairs around stomata harness humidity/decrease water loss; j. pitted/sunken stomata reduces transpiration/water loss;	7 max
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Question			Answers	Notes	Total
7.	c		a. piercing mouthparts/stylet for feeding on/sucking out sap; b. chewing mouthparts/mandibles for eating leaves/stems/wood; c. grinding teeth/ridged molars; d. multiple stomachs/long caecum/intestine for better digestion; e. able to detoxify plant toxins; f. make cellulase to digest cellulose/harbour cellulase producing microbes; g. e.g. some birds/hummingbirds have long beak/tongue for extracting nectar / any verifiable adaptation for feeding or digestion;		4 max

APOLLO

Ecological niches

4 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q25 | 1 marks

25. B

Biology SL | Paper 1A | May 2025 TZ1 | Q27 | 1 marks

27. A

2.	a	temperature / precipitation / winds / humidity / light / slope / soil / pH;		1
2.	b	(physical) place/environment where a community/species/population/organism lives;	OWTTE Do not accept e.g. "an organism's environment" without stating that it is where it lives.	1
2.	c	a. transect; b. quadrats; c. placed randomly/periodically; d. each different species identified; e. using (dichotomous) keys / software/app; f. use specific rule to decide if species in/out the quadrat; g. numbers of each species counted;	The answer ideally refers to the data but the question does not specify. b. Accept traps (to catch animals). f. Allow marking, release, recapture or a description.	3 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q25 | 1 marks

25. C

APOLLO

Enzymes and metabolism

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q5 | 1 marks

5. D

Biology SL | Paper 1A | May 2025 TZ3 | Q5 | 1 marks

5. D

4.	a	(storage) temperature;		1
4.	b	pH / enzyme/lipase concentration / substrate concentration / volume of oil/lipase / type of oil;		1
4.	c	a. negative correlation / as (storage) temperature increases, relative enzyme activity decreases; b. enzyme begins to denature / active site changed / enzyme changes shape (as temperature increases) OR enzyme activity is highest near the optimum temperature;	a. <i>accept inverse</i> b. <i>accept inverse</i>	2
4.	d	the (size of the) error bars;		1
4.	e	a. measure pH using a probe/(chemical) indicator/meter/digital meter/pH strip/pH paper/any valid method of measuring pH; b. measure the time taken for pH/colour change;	a. <i>Needs how the pH was measured e.g probe</i> b. <i>Rate requires measurement over time so accept 'over a given time' or example with time units e.g intervals of 10 minutes or intervals of time</i> Allow correctly named indicators	2

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q4 | 1 marks

4. B

3.	a	enzyme/papain/bromelain concentration OR type of enzyme OR time (24 and 48 hrs);	<i>Do not accept enzyme alone.</i>	1
3.	b	(as concentration increases) tyrosine increases (at both times) OR positive correlation;		1
3.	c	a. 48 h/hours has higher activity / more tyrosine produced than after 24 h/hours; b. only 48 h/hours has a (nearly) constant increase in tyrosine OR 48 h/hours has a steeper gradient/sharper rise;	<i>Or vice versa.</i> <i>Do not accept faster rate OWTTE.</i>	2
3.	d	a. proteins are digested/broken down/degraded into <u>amino acids</u> ; b. the more (protease) activity the more amino acid/tyrosine produced; c. not all proteins contain tyrosine / have different amounts OR some tyrosine is released with no enzyme; d. other amino acids could be measured;	<i>a. Accept proteins are composed of amino acids.</i>	3 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q5 | 1 marks

5. A

Biology SL | Paper 1A | Specimen 2025 | Q7 | 1 marks

7. B

APOLLO

Cell respiration

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ2 | Q4 | 1 marks

4. C

Biology SL | Paper 1A | May 2025 TZ3 | Q6 | 1 marks

6. C

7.	a	a. compact/less storage space needed due to coiling and branching; b. insoluble/poorly soluble due to larger molecular size; c. relative ease of adding/condensation of monosaccharides/glucose to store energy; d. relative ease of removing/hydrolysis of monosaccharides/glucose to mobilize energy;		3 max
7.	b	a. photosynthesis (in plants) transforms sunlight to chemical energy in carbon compounds/glucose; b. herbivores/ primary consumers obtain energy by eating plants/producers; c. energy is passed along the food chain by feeding; d. energy is lost by organisms through cell respiration/movement/maintaining body temperature/ named process (as heat); e. approximately 10 % of energy passes to the next trophic level; f. energy available for higher trophic levels is limited (by energy loss); g. number of trophic levels / lengths of food chains is limited (by energy loss); h. decomposers gain energy by breaking down dead organisms;		4 max

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2225 – 6018

Question		Answers	Notes	Total
7.	c	The need for energy a. life processes/active transport/metabolism/movement require energy; b. ATP provides energy for cell processes; c. energy need to break bonds in a substrate during enzyme reactions; d. energy is required to synthesize ATP from ADP OR energy is released when ATP is hydrolysed; Release of energy e. cell respiration produces ATP using energy stored in carbon compounds/glucose/fatty acids; f. aerobic respiration occurs in mitochondria; g. aerobic respiration requires oxygen; h. aerobic respiration provides more ATP/energy than anaerobic respiration; i. cells use mainly glucose and/or fatty acids as a fuel/substrate for respiration; j. in aerobic respiration carbon dioxide and water are waste products OR fuel/glucose + O₂ → CO₂ + H₂O (+ energy/ATP); k. anaerobic respiration (in humans) yields lactic acid as a waste product OR fuel/glucose → lactic acid (+ energy/ATP);	Correct equation can gain marking points g. and j. Equation does not need to be balanced.	8 max

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2225 – 6018

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ3 | Q4 | 1 marks

4. C

3.	a	oximeter/oxygen meter/probe/sensor OR respirometer;	<i>Do not accept spirometer.</i> <i>Do not accept respiration measurer and respirator.</i> <i>Do not accept oxygen detector.</i> <i>Do not accept carbon dioxide meter/probe/sensor.</i>	1
3.	b	CO ₂ /carbon dioxide / pH/acidity/acid;	<i>Ignore oxygen.</i> <i>Do not accept carbon alone.</i>	1
3.	c	(-) 6 (°C);	<i>Units not required for the mark.</i>	1

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8825 – 6023M

Question		Answers	Notes	Total
3.	d	a. <i>A. limbata</i> /Pacific species/ <i>A. aurita</i> /Atlantic species because respiration rate increases (at higher temperature); b. (which results in) more energy/ATP (for growth/reproduction/cell division);	<i>a. It must refer to an increase in respiration rate, not a comparison of respiration rates in the two species.</i> <i>Do not accept references to maximum respiration at higher temperatures/stated higher temperature if no increase in respiration rate mentioned.</i> <i>Do not accept answers referring to a positive correlation without naming the correlated variables.</i>	2 max

Question		Answers	Notes	Total
3.	e	a. (it is) active transport; b. protein pump/carrier used OR Na⁺- K⁺/sodium-potassium pump used; c. (3) Na⁺/sodium (ions) moved out and (2) K⁺/potassium (ions) in OR (3) Na⁺/sodium (ions) and (2) K⁺/potassium (ions) moved against their concentration gradients / OWTTE; d. membrane is polarized / outside (of the axon) is positive, whereas inside is negative OR resting potential is -70 mV;	<i>Ignore reference to action potential, depolarization and repolarization.</i> <i>b. Do not accept membrane channels.</i> <i>b. Do not accept proteins alone.</i> <i>c. Both ions and both directions required for the mark.</i> <i>c. Ignore reference to diffusion/channels if the ions and directions are correct.</i> <i>d. Allow answers in the range of –80 mV to –50 mV. The correct unit is required if a value is stated.</i>	2 max

Question	Answers	Notes	Total
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4.	a	a. active transport (across membranes); b. synthesis of proteins/polysaccharides/nucleic acids/macromolecules OR (any) condensation reactions / anabolic reactions; c. movement of the cell/muscle contraction OR movement of chromosomes/cell components;	<i>Accept more precise examples of active transport, synthesis or movement such as sodium potassium pump, DNA synthesis, photosynthesis, glycolysis, protein synthesis.</i> <i>Accept the first two answers given in a list.</i>	2 max
4.	b	a. (ATP) is synthesized during (cell) respiration; b. anaerobic makes less ATP than aerobic; c. (ATP) is produced from carbon compounds/glucose; d. glucose + oxygen produces carbon dioxide + water + ATP; e. glucose changing to lactic acid (produces ATP); f. (ATP) is produced in mitochondria OR (ATP) is produced in the cytoplasm by anaerobic respiration;	<i>b. Accept vice versa.</i>	3 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q6 | 1 marks

6. D

APOLLO

Photosynthesis

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q4 | 1 marks

4. B

Biology SL | Paper 1A | May 2025 TZ2 | Q5 | 1 marks

5. C

Biology SL | Paper 1A | Nov 2025 TZ1 | Q5 | 1 marks

5. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q5 | 1 marks

5. C

2.	a	<u>transect</u> ;		1
2.	b	<i>Similarities:</i> a. highest values at 219m and 780m in both OR lowest values at 1268m/highest altitude in both OR similar values at 219m and 780m in both OR values decrease at 405m in both; <i>Differences:</i> b. (all) values/value at a stated altitude for leaf litter lower than fresh leaves OR values for 405m and 1268m are similar in the litter but not in the fresh OR the highest value for fresh leaves is at altitude 780m, but 219m for leaf litter / OWTTE;	a. Do not accept answers referring to a general decrease in carbon isotope content with increasing altitude. b. Do not accept just stating values for litter and fresh leaves without a comparison. b. Accept vice versa. Accept any other valid similarity or difference.	2

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8825 – 6023M

Question		Answers	Notes	Total
2.	c	temperature / rainfall/humidity/water (availability) / light (intensity) / oxygen (concentration) / carbon dioxide (concentration) / <u>soil</u> pH/composition/minerals/nutrients;	Accept the first answer only.	1
2.	d	a. through stoma/stomata / opening between guard cells; b. <u>air spaces</u>; c. (spongy/palisade) mesophyll (cells) OR across <u>membrane</u> of chloroplast;	a. Do not accept pores alone for stomata, but accept stomatal pores. c. Do not accept across membrane alone, without reference to chloroplasts.	2 max

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8825 – 6023M

Question	Answers	Notes	Total
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2.	a	a. palisade mesophyll; b. spongy mesophyll; c. lower epidermis; d. upper epidermis; e. xylem/phloem/vascular bundle;	1 mark for each correctly labelled tissue shown as a layer in proportion:	3
2.	b	a. correct measurement of the line on the image (+/-1mm); b. correct calculation and including units;	Allow ECF – ruler measurements +/- 1mm	2
2.	c	a. it is easier to find the specimen using a low power objective lens OR there is a larger field of view/depth of focus; b. it is easier to locate the most interesting part of the specimen with a low power objective lens; c. most microscopes are calibrated so that once in focus using the low power objective lens they will be close to focus using the higher power, so this helps focusing; d. reduced risk of cracking the slide;		1
2.	d	a. double layer of palisade cells; b. palisade layer on upper surface; c. dimensions of palisade cells maximize light absorption; d. thin/transparent epidermis/cuticle;		1

Question	Answers	Notes	Total
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APOLLO

Neural signalling

11 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q17 | 1 marks

17. B

Biology SL | Paper 1A | May 2025 TZ3 | Q12 | 1 marks

12. D

3.	a	i	as axon diameter increases, the speed of transmission increases too / positive correlation/relationship;		1
3.	a	ii	a. R^2 is the coefficient of determination; b. R^2 compares variation between dependent and independent variables; c. R^2 represents the (percentage of) data that is closest to the line of best fit/regression line; d. $0.92/R^2$ is close to 1 / is highly significant; e. 92% of the variation in conduction velocity can be explained by variations in axon diameter;	e. 92% must be mentioned.	2 max
3.	b		sensory (neurons) transmit impulses to CNS/spinal cord/brain/interneurons while motor transmit away from CNS/spinal cord/brain/interneurons OR sensory receive impulses from sense organs/receptors while motor stimulate effectors/muscles/glands;	Accept an annotated diagram eg reflex arc with both neurons.	1 max
3.	c		a. ATP is stable/soluble in the cytoplasm; b. (ATP) stores/supplies energy / is energy currency; c. when ATP is converted to ADP / a phosphate group is released (from ATP); d. <u>hydrolysis</u> produces ADP; e. the small amounts of energy involved means little energy is wasted; f. ATP is easily/rapidly regenerated (from ADP and P);		3 max

Question	Answers	Notes	Total
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3.	a	the neuron is insulated since it shows Schwann cells/myelin sheath can be seen;		1
3.	b	a. DNA/chromosomes; b. ribosomes; c. plasma/cell membrane/phospholipid bilayer; d. cytoplasm/cytosol;		2 max
3.	c	a. action potential/nerve impulse reaches the end of the presynaptic neuron; b. impulse/action potential/depolarization of the (presynaptic) membrane causes calcium (ions)/Ca ²⁺ uptake/diffusion into the neuron; c. (calcium ions) cause vesicles to move to the (presynaptic) membrane; d. vesicles contain neurotransmitter; e. neurotransmitter released into the synaptic gap/cleft by exocytosis/when vesicle fuses with membrane;		3 max

Question	Answers	Notes	Total
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6.	a		a. dendrite; b. receives impulse/signals/neurotransmitter from (adjacent) neuron OR conducts/passes impulses/signals towards cell body/neuron;		2 max
6.	b		a. calcium/ Ca^{2+} /Ca moves into the presynaptic membrane OR neurotransmitter/acetylcholine released from presynaptic membrane; b. (neurotransmitter) diffuses across the synapse/synaptic cleft; c. binds to transmembrane receptors/receptors in postsynaptic membrane; d. (protein) channels open/ Na^{+} /positive ions diffuse in; e. causes depolarization (of (post synaptic) membrane) / action potential / membrane potential increases;		3 max

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q11 | 1 marks

11. A

Biology SL | Paper 1A | Nov 2025 TZ1 | Q16 | 1 marks

16. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q11 | 1 marks

11. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q17 | 1 marks

17. C

5.	a	neurotransmitter/acetylcholine/another verified example of neurotransmitter;		1
5.	b	a. (only) pre-synaptic membrane has calcium channels/allows calcium to diffuse across OR (only) pre-synaptic membrane releases neurotransmitters from their axon terminals; b. (only) post-synaptic membrane has receptors for neurotransmitter OR (only) accept neurotransmitter in their dendrites/post-synaptic membrane; c. the presynaptic membrane is at the axon terminal, but the post synaptic membrane is at a dendrite;	<i>Accept other verified differences.</i>	2 max
5.	c	short distance for diffusion of neurotransmitter; synaptic transmission is faster;		1 max

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q13 | 1 marks

13. B

APOLLO

Integration of body systems

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q16 | 1 marks

16. A

Biology SL | Paper 1A | May 2025 TZ2 | Q15 | 1 marks

15. D

Biology SL | Paper 1A | May 2025 TZ2 | Q16 | 1 marks

16. B

Biology SL | Paper 1A | May 2025 TZ3 | Q17 | 1 marks

17. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q18 | 1 marks

18. A

Biology SL | Paper 1A | Specimen 2025 | Q19 | 1 marks

19. D

APOLLO

Defence against disease

9 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q18 | 1 marks

18. A

Biology SL | Paper 1A | May 2025 TZ2 | Q18 | 1 marks

18. C

Biology SL | Paper 1A | May 2025 TZ3 | Q18 | 1 marks

18. C

Biology SL | Paper 1A | May 2025 TZ3 | Q19 | 1 marks

19. B

Biology SL | Paper 1A | Nov 2025 TZ1 | Q17 | 1 marks

17. B

Biology SL | Paper 1A | Nov 2025 TZ1 | Q18 | 1 marks

18. A

Biology SL | Paper 1A | Nov 2025 TZ3 | Q16 | 1 marks

16. B

1.	a	a. on day 7 there is reduced (total surface) area of lesional skin; b. reduced (total surface) area of lesional skin with skin plaques; c. lesional skin is reducing on the arms;	Accept converse for Day 0 throughout. Accept 'bigger/smaller lesions/plaques'. Accept Skin free of lesion increase as vice versa of mark point a. Accept mention of % or proportions as long as they are linked e.g. is bigger is smaller etc. Do not accept 'fewer lesion/plaques'.	2 max
1.	b	a. measure the lesional area (and the total area of the back); b. find/calculate the percentage/proportion of the back affected (by lesions); c. calculate/compare the (percentage) change between Day 0 and Day 7; d. use a (statistical) test to assess if the difference between groups is significant;	Can accept references to changes in unaffected area as a method (mark points a, b and c). b. is about calculations of coverage of affected areas. c. is about calculations comparing affected area between day 0/at start/before and day 7/at the end/after.	2 max

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8825 – 6024M

Question		Answers	Notes	Total
1.	c	a. low reliability as only five/very few males/small sample size studied; b. low reliability as no control/no men without treatment;	Do not accept 'low' unqualified but must be included for a mark/s. Do not accept reference to not enough data without mentioning what data is being referred to. Ignore references to validity, e.g. 'only males studied' / 'only the area of skin on the back studied' or 'only 7 days'.	1 max
1.	d	3.75 (%);	Accept range between 3.7 and 3.8	1
1.	e	0.8 (%);	Allow values between 0.7 and 0.9 (%) inclusive. Can accept negative values.	1

Question		Answers	Notes	Total
1.	f	(as a control) to compare the amount of expression of genes in normal and lesional skin OR (as a control) to compare the amount of expression of WMT5A and IL24 in normal and lesional skin OR (as a control) to compare the %/number/amount of fibroblasts (expressing the genes) in normal and lesional skin OR to make sure that the drug doesn't harm/have side effects in normal skin;	<i>Do not accept 'as a control' unqualified nor reference just to lesions or just to treatment / comparisons is between unaffected and lesions</i>	1

Question		Answers	Notes	Total
1.	g	a. decrease in (mean) fibroblast (that over express the gene) percentages from Day 0 to Day 7; b. treatment does not eliminate/stop over expression (of genes/WNT5a and IL24) OR unaffected tissue does not over express (genes/WNT5a and IL24); c. probability that the difference between (mean) fibroblast percentages between lesional tissue on Day 0 and Day 7 occurred by chance is less than 0.05/5% OR probability that the difference between (mean) fibroblast percentages between lesional and non-lesional tissue on Day 0 occurred by chance is less than 0.001/0.1% OR the difference between (mean) fibroblast percentages of lesional tissue (on day 0 to Day 7) is <u>statistically</u> significant;	<i>Do not accept decrease in lesions or decrease in fibroblasts alone (must refer to percentage/amount).</i> <i>For b. accept OWTTE</i>	2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q20 | 1 marks

20. B

APOLLO

Populations and communities

12 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q24 | 1 marks

24. C

Biology SL | Paper 1A | May 2025 TZ1 | Q26 | 1 marks

26. B

Biology SL | Paper 1A | May 2025 TZ2 | Q25 | 1 marks

25. D

Biology SL | Paper 1A | May 2025 TZ2 | Q27 | 1 marks

27. C

Biology SL | Paper 1A | May 2025 TZ3 | Q26 | 1 marks

26. D

Biology SL | Paper 1A | May 2025 TZ3 | Q27 | 1 marks

27. B

Biology SL | Paper 1A | Nov 2025 TZ1 | Q26 | 1 marks

26. A

Biology SL | Paper 1A | Nov 2025 TZ3 | Q27 | 1 marks

27. B

Biology SL | Paper 1A | Specimen 2025 | Q28 | 1 marks

28. C

Biology SL | Paper 1A | Specimen 2025 | Q29 | 1 marks

29. A

3.	a	actively varied/manipulated (by the experimenter)/OWTTE	1
3.	b	25 °C	1
3.	c	a. temperature is a limiting factor (for enzymes) OR other limiting factors are influenced by temperature OR temperature is closer to the optimum temperature (of the enzymes); b. at higher temperature exchange of materials is more efficient; c. plants are reproducing/photosynthesising slowly at lower temperature / vice versa; d. dying faster than reproducing at lower temperature / vice versa;	2
3.	d	a. (larger culture dishes with) bigger starting duckweed populations; b. several replicates at each temperature; c. apply (appropriate) statistical analysis;	1

Question	Answers	Notes	Total
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5.	a		a. <u>interspecific</u> since it is between two species; b. <u>mutualistic</u> since both organisms benefit; c. (trophic relationship is) plant is a producer AND hummingbird is a primary consumer/herbivore;		2
5.	b		a. colour/patterns on flower parts; b. scent; c. providing nutrients/nectar;		1
5.	c		a. feed at a time when the predator is not active; b. remain very active/alert while feeding; c. mimic another organism; d. exaggerate their size;		1

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SPEC/4/BIOLO/SP2/ENG/TZ0/XX/M

Question	Answers	Notes	Total
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APOLLO

Transfers of energy and matter

18 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q28 | 1 marks

28. C

Biology SL | Paper 1A | May 2025 TZ1 | Q30 | 1 marks

30. C

Biology SL | Paper 1A | May 2025 TZ2 | Q24 | 1 marks

24. B

Biology SL | Paper 1A | May 2025 TZ2 | Q26 | 1 marks

26. D

Biology SL | Paper 1A | May 2025 TZ2 | Q28 | 1 marks

28. B

Biology SL | Paper 1A | May 2025 TZ3 | Q28 | 1 marks

28. B

Biology SL | Paper 1A | May 2025 TZ3 | Q30 | 1 marks

30. C

5.	a		a. may kill useful species/pollinators; b. greater loss of biodiversity/species diversity OR greater disruption to food webs/chains;		1 max
5.	b	i	secondary consumer;		1
5.	b	ii	a. biomagnification/bioaccumulation; b. (insecticide) is not broken down / <i>OWTTE</i> ; c. (so) stored/accumulated/increased in organism/tissues/fat; d. (so) not excreted; e. birds eat large numbers of (large) fish OR animals at higher trophic levels eat animal below / (animals) receive/accumulates insecticide from the previous trophic level OR large numbers of organisms lower down with high insecticide level / <i>OWTTE</i> ;		3 max

Question	Answers	Notes	Total
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8.	a	a. LH stimulates progesterone production / ovaries/corpus luteum produce progesterone; b. (progesterone) inhibits FSH and LH; c. inhibition of FSH prevents follicles developing/maturing; d. inhibition of LH prevents ovulation/egg release (from ovary); e. maintains/increases thickness of endometrium/uterus lining; f. inhibition of FSH/LH is (an example of) <u>negative feedback</u>; g. if egg is not fertilized, progesterone level falls/corpus luteum degenerates OR if egg is fertilized, progesterone level remains high/does not fall/corpus luteum is maintained;		4 max
8.	b	a. PCR amplifies DNA/makes many copies of DNA; b. (DNA) heated to high temperatures to separate strands/break hydrogen bonds / denature; c. cooled/temperature lowered; d. use of primers (to identify DNA to be replicated) / primers bind (to DNA strands); e. Taq polymerase is heat-stable/does not denature at high temperatures; f. (Taq) polymerase joins nucleotides (on new DNA strands)/forms phosphodiester bonds; g. the process is repeated numerous times to produce sufficient DNA;	<i>b. Both references to increased temperature and separation of strands are needed for this marking point.</i>	4 max

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2225 – 6024

Question		Answers	Notes	Total
8.	c	a. plants/autotrophs use CO₂ in <u>photosynthesis</u>; b. plants/autotrophs release CO₂ during <u>respiration</u>; c. (CO₂) converted to organic compounds/glucose/starch/cellulose/fat/protein; d. (transferred) to consumers/animals by feeding; e. consumers/animals/detritus feeders/heterotrophs release CO₂ during <u>respiration</u>; f. plants/animals die forming (dead) organic matter; g. saprotrophs/decomposers digest dead plants/animals; h. saprotrophs/decomposers release CO₂ by <u>respiration</u>; i. fossilization/incomplete decomposition produces fossil fuels/coal/oil/peat/gas OR anaerobic respiration releases methane/ruminant (cows) release methane; j. combustion of fossil fuels/plants/biomass releases CO₂;	<i>Accept annotated diagrams that clearly show the relevant marking points.</i>	7 max

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q27 | 1 marks

27. B

Biology SL | Paper 1A | Nov 2025 TZ1 | Q28 | 1 marks

28. B

Biology SL | Paper 1A | Nov 2025 TZ3 | Q25 | 1 marks

25. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q26 | 1 marks

26. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q28 | 1 marks

28. B

5.	a	uses light/external sources (chemicals) as an energy source to make complex carbon/organic compounds (from simple/inorganic molecules);	<i>Do not award a mark if it is clear candidates are referring to organic "food" being used as an energy source.</i> <i>Do not award a mark if the definition refers to making food alone, a reference to complex carbon/organic compounds is needed.</i> <i>Accept OWTTE</i>	1
5.	b	a. decomposers are bacteria/fungi /invertebrates; b. break down dead organic matter / faeces; c. release/recycle minerals/nutrients (into the environment);	<i>For b. there MUST be a reference to the matter being dead / deceased etc. but we can accept other clear references.</i> <i>Do not accept reference to recycling carbon alone as this is not a unique property of decomposers.</i>	2 max
5.	c	a. energy is lost between trophic levels as heat/metabolism/10% (or less) is transferred (accept converse); b. length of food chains varies / number of trophic levels in the food chains vary; c. some animals / herbivores may be able to digest (more) plant material/ cellulose/ parts of their food such as skin or bones than other animals; d. some animals are different in size / are more active; e. use more energy (to keep warm or cool) than others/are warm or cold blooded;		3 max

– 15 –

8825 – 6024M

Question		Answers	Notes	Total
5.	d	a. <u>methane</u> production (by cows) is a greenhouse gas; b. deforestation (to provide land for grazing) reduces carbon dioxide removal from the atmosphere by photosynthesis OR burning of trees (to provide land for grazing) produces carbon dioxide; c. greenhouse gases (carbon dioxide/CO ₂ /methane) lead to the enhanced greenhouse effect/global warming ; d. cattle farming releases more greenhouse gases than plant-based crops;	<i>b. is referring to CO₂, do not accept deforestation/burning alone.</i>	2 max

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8825 – 6024M

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q26 | 1 marks

26. C

Biology SL | Paper 1A | Specimen 2025 | Q27 | 1 marks

27. D

1.	a		a. the plants are unable to absorb copper; b. cows eat the copper-deficient plants;		2
1.	b		a. liming; b. as Cu becomes less bioavailable at neutral/basic pH;		2
1.	c		creation of antibodies / white blood cell function;		1
1.	d	i	any pH value above pH 7 or below 5.5;		1
1.	d	ii	a. nucleic acids /DNA/ RNA/nucleotides; b. ATP/phospholipids;		1

Question	Answers	Notes	Total
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APOLLO

DNA replication

2 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ2 | Q6 | 1 marks

6. B

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

7. A

APOLLO

Protein synthesis

5 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q6 | 1 marks

6. B

Biology SL | Paper 1A | May 2025 TZ2 | Q7 | 1 marks

7. D

Biology SL | Paper 1A | Nov 2025 TZ1 | Q6 | 1 marks

6. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q6 | 1 marks

6. C

2.	a	a. essential amino acids cannot be synthesized (by human cells) OR essential amino acids are required to be obtained by diet / OWTTE; b. non-essential amino acids can be made (from other amino acids);		2
2.	b	X = (small subunit of) ribosome; Y = <u>m</u> RNA / <u>messenger</u> RNA;	<i>Do not accept RNA without messenger or m.</i>	2
2.	c	a. ribosome moves along the mRNA molecule/structure X moves along Y; b. amino acids added (to the polypeptide) one by one OR some polypeptides are still in formation / OWTTE; c. more amino acids added to the polypeptide by the ribosome on the right;		2 max

Question	Answers	Notes	Total
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APOLLO

Mutation and gene editing

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ2 | Q17 | 1 marks

17. A

Biology SL | Paper 1A | May 2025 TZ2 | Q29 | 1 marks

29. A

Biology SL | Paper 1A | May 2025 TZ3 | Q8 | 1 marks

8. A

Biology SL | Paper 1A | Nov 2025 TZ1 | Q7 | 1 marks

7. C

4.	a	a. budding; b. asexual reproduction / mitosis; c. unequal cytokinesis;	<i>a. and b. Accept description of process.</i> <i>Do not accept description of meiosis.</i> <i>Do not accept (binary) fission.</i>	2 max
4.	b	point/substitution / deletion / insertion / frameshift (mutation);	<i>Do not accept (skin) cancer.</i>	1
4.	c	food / energy/ATP/respiration / osmotic concentration/water potential;	<i>Accept nutrients/nutrition and fermentation.</i>	1
4.	d	i UV/sunlight kills yeast in (control) 2 but not in (control) 1 OR more mutations in (control) 2 which inhibits reproduction/colony growth;	<i>Accept vice versa and OWTTE.</i> <i>A reason must be given e.g. kills yeast, not just presence or absence of UV/sunlight.</i> <i>Do not accept light alone.</i>	1
4.	d	ii SPF50 blocks/absorbs more UV/sunlight / more protection against UV/sunlight OR SPF50 greater reduction in mutation/damage in yeast;	<i>Accept vice versa.</i>	1
4.	e	a. cotton clothes give more UV/sunlight protection (than polyester); b. results in yeast may not be the same as in humans; c. limited data / no repeats so difficult to evaluate / assess significance;	<i>a. Or vice versa.</i> <i>c. Allow a specific limitation e.g. thickness/colour of fabric.</i>	2 max

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q8 | 1 marks

8. B

7.	a		a. mutations are random changes in the sequences of genes/DNA; b. (mutation) may involve addition/deletion/substitution/inversion of DNA bases; c. (mutations) in tumour suppressor genes/oncogenes; d. uncontrolled cell division/mitosis occurs; e. abnormal cells cannot perform their function; f. they divide repeatedly to form tumours;		4
7.	b		a. name of condition e.g. PKU / other example; b. mutation in the gene for (the enzyme) phenylalanine hydroxylase (PAH) / if other example used name of gene that is mutated; c. outline of inheritance pattern, e.g. both parents need to carry the recessive allele; d. (without dietary modification, result is) toxic build-up of phenylalanine in the blood / low levels of tyrosine / symptoms if other example used; e. phenylalanine is not converted to tyrosine (by the enzyme) / effect of the mutation on the protein/enzyme/metabolism if other example used; f. requires dietary modification (as treatment) / treatment for other example used;		4

(continued...)

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SPEC/4/BIOLO/SP2/ENG/TZ0/XX/M

(Question 7 continued)

Question		Answers	Notes	Total
7.	c	a. new phenotypes/traits may result from mutations; b. mutations increase variation/differences between individuals in a population/species; c. individuals with new phenotype/trait may have more chances of survival; d. (more chances of survival) in a changing environment / presence of selection pressures; e. (selection pressure can be) intraspecific competition/abiotic factor; f. natural selection occurs; g. individuals with (advantageous) mutation have longer life spans/live longer; h. (so) more chances of reproduction; i. mutated gene passed on to new generations; j. allele frequencies change in the population over time; k. evolution is a consequence of natural selection;		7

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SPEC/4/BIOLO/SP2/ENG/TZ0/XX/M

Question	Answers	Notes	Total
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APOLLO

Cell and nuclear division

6 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q11 | 1 marks

11. D

Biology SL | Paper 1A | May 2025 TZ2 | Q12 | 1 marks

12. B

Biology SL | Paper 1A | May 2025 TZ3 | Q13 | 1 marks

13. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q12 | 1 marks

12. A

1.	a	i	third row (from the top);	<i>Accept an arrow going to the third row or underlined. Must indicate the entire row.</i>	1
1.	a	ii	48 / 24 <u>pairs</u> ;		1
1.	b		female as all chromosome pairs are similar in size/length OR female because in males X is larger than Y;	<i>Must refer to size; do not accept absence of Y. Female alone does not get a mark.</i>	1
1.	c		a. photograph/image of chromosomes in metaphase/mitosis/cell division; b. chromosomes arranged in (homologous) pairs; c. (pair chromosomes) according to size/length/centromere position; d. (pair chromosomes) by banding pattern;		2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q15 | 1 marks

15. A

APOLLO

Water potential

3 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q12 | 1 marks

12. C

6.	a	a. cohesion is caused by the polarity of water OR water molecules have a negative and positive end; b. water molecules are attracted to each other OR water molecules are linked by hydrogen bonds; c. (cohesion) enables water to move along stems/xylem OR enables a continuous column of water in transpiration/transpiration pull; d. surface tension provides a habitat for some organisms OR some insects can walk on water surface because of surface tension/other verified example OR cohesion is related to buoyancy allowing organisms (like ringed seal) to float; e. helps animals regulate body temperature (through evaporative cooling); f. (cohesion causes high specific heat) so maintains a stable temperature in aquatic environments OR water is liquid at a wide range of temperatures supporting many aquatic habitats;		4 max
6.	b	a. transpiration is the evaporation of water from the stomata/openings of the plant leaf; b. increase in humidity will decrease water loss/transpiration; c. increase in temperature will increase water loss/transpiration; d. increase in wind/ air movement will increase water loss/transpiration; e. increase in light intensity will increase water loss/transpiration;	<i>Accept vice versa for these statements</i>	4 max

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2225 – 6012M

Question		Answers	Notes	Total
6.	c	a. osmosis is <u>water</u> moving through a partially/semi permeable membrane/cell membrane/aquaporins; b. osmosis is a form of simple diffusion OR water travels down the (water) concentration gradient OR osmosis is passive; c. the solute concentration determines the direction of net movement of water; d. plant cells in hypotonic solutions will take in water; e. they will swell/are turgid/develop turgor pressure (in hypotonic solutions); f. cell wall prevents the plant cells from bursting due to water pressure (in hypotonic solutions); g. plant cells in hypertonic solutions will lose water; h. they will shrink/get smaller/flaccid (in hypertonic solutions); i. the cell membrane will pull away from the cell wall/plasmolysis (in hypertonic solutions); j. isotonic solutions are the same concentration as inside the plant cells/cytoplasm/cell sap; k. plant cells will have no net change (in isotonic solutions)/water moves equally in and out of the cell/dynamic equilibrium;		7 max

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2225 – 6012M

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q12 | 1 marks

12. C

APOLLO

Reproduction

7 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q19 | 1 marks

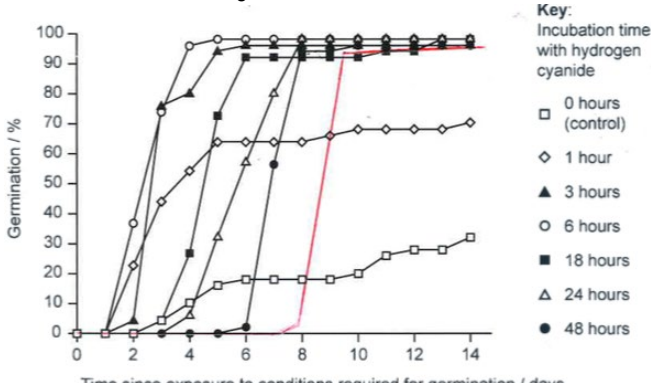
19. A

Biology SL | Paper 1A | May 2025 TZ2 | Q19 | 1 marks

19. B

Biology SL | Paper 1A | May 2025 TZ3 | Q20 | 1 marks

20. A

1.	a	20(%);	accept 19 - 22%	1
1.	b	a. germination starts between 6-8 days; b. reaches between 90-95% germination;  Key: Incubation time with hydrogen cyanide □ 0 hours (control) ◇ 1 hour ▲ 3 hours ○ 6 hours ■ 18 hours △ 24 hours ● 48 hours Used with permission of Oxford University Press - Journals, from <i>Journal of Experimental Botany</i>, Society for Experimental Biology (Great Britain), Federation of European Societies of Plant Physiology, Vol. 59, Issue 8, 2008. Permission conveyed through Copyright Clearance Center, Inc.		2

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2225 - 6012M

Question	Answers	Notes	Total
1. c	Similarities: a. both showed an increase in germination OR at 3 days the seeds incubated for 18 hours have the same percentage germination as the control OR both seeds incubated for 18 hours, and the control seeds did not germinate during the first 2 days; Differences: b. a higher percentage of seeds germinated when incubated 18 hours than the control seeds OR percentage of germinated seeds incubated for 18 hours shows a steeper increase than the control seeds (between 3 and 5 days) OR seeds incubated for 18 hours level off but percentage of germinated seeds in control continues to increase gradually;		2

Question		Answers	Notes	Total
1.	d	longer (more than 6) hours incubation (with cyanide) causes a delay in days to begin germination OR there is a lag in germination rate at the beginning of each cyanide line (with 6 or more hours) that is not present in the control line / <i>OWTTE</i>;		1

Question		Answers	Notes	Total
1.	e	a. from the graph, 6 hours produced the fastest germination; b. no incubation times between 6 and 18/3 and 6 hours were tested (so cannot say what the optimum incubation time is) OR the hypothesis is not supported because seeds incubated with different hours eventually reach 100%/close to 100% germination;		2
1.	f	0.5 nl h ⁻¹ g ⁻¹ ;	<i>Units required</i> <i>Accept answers between 0.4 and 0.5</i>	1
1.	g	135;	<i>Accept answers from 131 and 137.</i>	1
1.	h	<i>Similarity</i> a. both D and ND (seed embryos) produced more ethylene with incubation in cyanide; <i>Difference</i> b. ND (seed embryos) produced more total ethylene than D OR D (seed embryos) show a bigger proportional increase than ND seeds OR D has a bigger spread of data;		2

Question			Answers	Notes	Total
2	a		mutation OR sexual reproduction/meiosis/random fertilization/crossing over/independent assortment;		1

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q19 | 1 marks

19. D

Biology SL | Paper 1A | Nov 2025 TZ3 | Q19 | 1 marks

19. D

Biology SL | Paper 1A | Specimen 2025 | Q22 | 1 marks

22. A

APOLLO

Inheritance

10 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q7 | 1 marks

7. B

Biology SL | Paper 1A | May 2025 TZ1 | Q13 | 1 marks

13. C

Biology SL | Paper 1A | May 2025 TZ1 | Q20 | 1 marks

20. C

Biology SL | Paper 1A | May 2025 TZ2 | Q20 | 1 marks

20. B

Biology SL | Paper 1A | May 2025 TZ3 | Q21 | 1 marks

21. C

8.	a	a. DNA is replicated before mitosis / during interphase; b. after replication chromosomes consist of 2 chromatids/DNA molecules held together; c. during anaphase the sister chromatids are separated; d. each new/daughter cell receives copies of the original chromosomes; e. two genetically identical daughter cells are produced OR mitosis maintains chromosome number in new/daughter cells;		3 max
8.	b	a. speciation is the splitting of a species into two or more species; b. organisms in the same species share most of their genome/DNA OR there is some variation in the genome/DNA/alleles within a species; c. variations arise through mutation/random orientation of bivalents/crossing over; d. these alleles/variations are passed on to offspring during sexual reproduction; e. selection pressures change the allele frequency / favourable alleles increase in frequency / unfavourable decrease; f. reproductive/geographical isolation/physical barrier may then lead to speciation;		4 max

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2225 – 6018

Question		Answers	Notes	Total
8.	c	a. offspring inherit genetic traits from sexually reproducing parents via the gametes; b. genetic information contained in the DNA is copied/replicated and passed on to offspring; c. diploid organisms have two copies of each gene/allele; d. alleles may be dominant or recessive / valid example of simple dominance/recessive inheritance; e. dominant phenotype may be homozygous or heterozygous; f. recessive phenotype is expressed in homozygous individuals / with two copies of the recessive allele; g. heterozygous individuals do not display the recessive phenotype but may have offspring that do; h. alleles may display codominance / partial dominance / incomplete dominance / valid example; i. some traits result from multiple alleles / valid example; j. multiple allele inheritance results in continuous variation; k. genes carried on the sex chromosomes /X chromosome display sex linkage / valid example; l. genes may be linked on autosomes / display autosomal linkage; m. new alleles may arise by mutation;	<i>Accept annotated examples/ diagrams /punnett grid/crosses.</i>	8 max

4.	a		combination of <u>alleles</u> carried/inherited (by an organism);		1
4.	b	i	0.5 / 50% / $\frac{1}{2}$;		1
4.	b	ii	(If on the X chromosome) ALTERNATIVE 1 Father evidenced route: a. 1 has only one dominant allele on X (and not on the Y) / would be $X^D Y$ / OWTTE; b. 1 passed his X chromosome/dominant allele to 3/7 / OWTTE OR son/8 could not inherit the disease; c. (so) all daughters would be affected / not possible for 3/7 to be healthy / OWTTE; ALTERNATIVE 2 Mother evidenced route: d. 2 does not have the dominant allele / is homozygous recessive / would be $X^d X^d$ / OWTTE; e. 2 passed her X chromosome/ X^d/recessive allele(s) to 6/8; OR 6/8/sons would receive the Y chromosome with no (dominant) allele / OWTTE; f. (so) all sons/8 would be healthy / not possible for 8 to be affected / OWTTE;	Accept Punnett grids, providing they are clearly annotated and identify specific individuals.	2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q20 | 1 marks

20. C

4.	a	prophase;		1
4.	b	a. (plasma/cell) membrane pulled inwards OR membrane/cell pinched together (around the equator of the cell); b. (by) ring of proteins / contractile ring/proteins OR (by) actin and myosin; c. cytoplasm is split / cell divides; d. organelles are distributed between the two cells OR organelles are pulled by microtubules to opposite poles;	a. Accept OWTTE, including cleavage furrow or an invagination forming. b. Do not accept proteins unqualified. b. Both actin and myosin required for the mark in the second alternative. c. Accept OWTTE.	2 max
4.	c	168-169/169-170/168-170 (cm);	Units not required for the mark. Accept the first range given. Accept answers with decimals, e.g. 168-169.9. Accept answers joined by 'and' or 'to' rather than a dash, e.g. 168 and 170 or 168 to 170. Do not accept individual numbers.	1

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8825 – 6023M

Question		Answers	Notes	Total
4.	d	a. <u>multiple alleles</u> OR (the alleles are) I^A , I^B , i ; b. I^A and I^B (alleles) are codominant to each other OR $I^A I^B$ (genotype) gives blood group/type AB; c. i (allele) is recessive to both I^A and I^B (alleles) OR I^A and I^B (alleles) are dominant to i (allele) OR $I^A i$ (genotype) gives blood group/type A and $I^B i$ (genotype) gives blood group/type B; d. 4 blood groups/types: A, B, AB, O; e. there are no intermediate blood groups/types;	a. Correct symbols required for the mark, but can be stated in different parts of the answer. Do not accept I for i for this mark. a., b. and c. Do not accept blood groups/types / genes for alleles. d. All four blood groups needed for the mark, but can be stated in different parts of the answer. e. Accept OWTTE.	3 max

6.	a		a. genetically determined/determined by (pair of) sex chromosomes/X and Y chromosomes; b. sperm carry either an X or a Y chromosome; c. egg is X and if fertilized by X sperm leads to a female child / XX female OR egg is X and if fertilized by Y sperm leads to a male child / XY male;		2
6.	b		a. recombination of parental alleles during fertilization; b. fertilized egg contains a mixture of paternal and maternal chromosomes; c. crossing over/meiosis gives rise to new combinations of alleles;		2

APOLLO

Homeostasis

8 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q21 | 1 marks

21. B

Biology SL | Paper 1A | May 2025 TZ2 | Q21 | 1 marks

21. A

Biology SL | Paper 1A | May 2025 TZ3 | Q22 | 1 marks

22. D

Biology SL | Paper 1A | Nov 2025 TZ1 | Q21 | 1 marks

21. C

Biology SL | Paper 1A | Nov 2025 TZ3 | Q20 | 1 marks

20. D

Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q21 | 1 marks

21. C

8.	a		a. normal body temperature is 37°C; b. peripheral thermoreceptors detect environmental temperature; c. supporting conscious behaviour to avoid temperature extremes, e.g. wearing more clothing; d. sends messages to hypothalamus/temperature control centre of the brain; e. the hypothalamus sends messages to pituitary gland; f. (pituitary) releases TSH; g. stimulating thyroxine release from thyroid; h. thyroxine controls metabolic rate / production of heat; i. muscle random contraction/shivering to generate heat; j. (brown) adipose tissue burns fat to generate waste heat; k. vasoconstriction to conserve heat / vasodilation to exchange heat with the environment;		7
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(continued...)

(Question 8 continued)

Question			Answers	Notes	Total
8.	b		a. as temperature increases, the rate of molecular motion increases; b. increasing the frequency of collision between enzyme and substrate; c. increasing the rate of reaction; d. until an optimum temperature is reached; e. with further increase in temperature, enzymes denature;		4
8.	c		a. water has a (much) higher specific heat capacity (than air); b. water requires more energy gain/loss to change temperature; c. (water) provides more stable thermal habitats than air / temperature of water bodies remains more constant than air temperature; d. water has a higher thermal conductivity than air; e. more heat is transferred from organisms to water than to air; f. water is a good evaporative coolant and air is not; g. aquatic mammals have (proportionally) more body fat as insulation;		4

APOLLO

Natural selection

5 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ1 | Q29 | 1 marks

29. C

2.	b	a. change in environment may cause which characteristics are advantageous/disadvantageous OR selection pressures change; b. natural selection favours organisms that are best adapted to survive in the (changed) environment OR organisms that possess the favourable genes/are best adapted to the environment will survive to / reproduce/pass their traits on; c. an example of a trait and how it may become more advantageous/disadvantageous for a specific change in environment;	Accept vice versa	2 max
2.	c	a. keystone species have a disproportionate/significant/high/large effect on the structure of an ecosystem / <i>OWTTE</i>; b. loss of biodiversity/diversity of species will occur; c. change of population size/numbers of other species may occur; d. change/disruption in food webs/chains would occur; e. example of loss and its effect;		2 max

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2225 – 6012M

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q29 | 1 marks

29. D

6.	a	a. soluble (in water/blood) SO it is easily transported; b. glucose is (easily) oxidised/used to produce ATP in (cell) respiration; c. has high energy bonds/energy rich / is a source of (chemical) energy; d. energy/ATP is used in muscle contraction/active transport/any correct biological answer; e. can be polymerized (by condensation) SO can be stored; f. can be converted into glycogen/starch/cellulose; g. polymers easily broken down so energy/glucose can be released;	<i>For b. do not accept Glucose "produces" energy alone</i> <i>For e. accept descriptions of polymerization</i>	5 max
6.	b	a. use of pesticides/insecticides (which may kill/harm pollinators); b. urbanization; c. loss of habitat/change of land use (monocultural/intensive farming practices); d. use of herbicide or removal of "weeds" reducing food sources; e. introduction of alien species;	<i>For a. or d. the mention of a specific pesticide or herbicide would be ok.</i>	3 max

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8825 – 6024M

Question		Answers	Notes	Total
6.	c	a. variation exists within a species / OWTTE; b. mutation generates variation/new alleles; c. meiosis/sexual reproduction generates variation (new combinations of alleles); d. example of flower's trait to be selected for in this context; e. (natural selection is caused by) selection pressures / changes in the environment / due to competition for pollinators / pollination; f. flowers that have an advantageous characteristic attract more insects; g. (plants with attractive flowers are) more likely to be pollinated/reproduce; h. pass on the new allele / combination of alleles/<u>heritable</u> trait; i. allele frequency increases over many generations; j. eventually different populations of this species can no longer produce fertile offspring/new species formed;	<i>For d. Award anywhere in response and allow examples including bright petals / enclosed anthers / enclosed stigma / sticky pollen. Also accept suggestions such as odour / colour that is particularly attractive to bees.</i> <i>For g. to j. Accept converse – i.e. individuals without the advantageous characteristic are less likely to reproduce and pass on their alleles, so alleles conferring a disadvantage are selected against.</i> <i>For g. do not accept survival.</i>	7 max

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8825 – 6024M

Question	Answers	Notes	Total
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Mark-scheme answers

Biology SL | Paper 1A | Specimen 2025 | Q30 | 1 marks

30. A

APOLLO

Stability and change

1 questions

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ3 | Q30 | 1 marks

30. B

APOLLO

Climate change

4 questions

Mark-scheme answers

Biology SL | Paper 1A | May 2025 TZ2 | Q30 | 1 marks

30. D

7.	a	a. carbon can form 4 bonds; b. carbon forms <u>covalent</u> bonds; c. carbon can form single or double/triple bonds; d. carbon can form bonds with other carbon atoms / with other (non-metallic) elements; e. carbon can form branched / unbranched chains; f. carbon can form single / multiple rings;		4 max
7.	b	a. (short term) storage of carbon/CO₂ in the atmosphere/aquatic environments as CO₂; b. photosynthesis/carbon fixation: carbon/CO₂ is absorbed; c. feeding: carbon is passed through food chains in organic molecules; d. (cellular) respiration returns carbon/CO₂ to the environment; e. (long term) storage of carbon in fossil fuels/ limestone/ forests; f. decomposition returns carbon/CO₂ to the atmosphere OR - decomposers/saprotrophs return carbon to the soil; g. carbon dioxide is put into the environment by burning/combustion OR - carbon dioxide is put into atmosphere by volcanic activity; h. used by coral/mollusca/specific organism as calcium carbonate to build shells;	Accept answers shown as an annotated carbon cycle.	4 max

Question	Answers	Notes	Total
7. c	a. greenhouse effect describes that greenhouse gases trap long-wave radiation from the Earth's surface and absorbs it keeping the Earth warm OR - increase in greenhouse gases trapped in atmosphere increases Earth's temperature; b. burning of fossil fuels/peat/coal/natural gas by humans has released more CO₂ into the atmosphere causing temperature rise on Earth; c. raising livestock for feed has added methane/greenhouse gas to the atmosphere causing more heat to be trapped on Earth; d. industrial processes / fertilizer production has increased the concentration of nitrous oxides/greenhouse gases in the atmosphere; e. deforestation has increased the amount of CO₂ in the atmosphere/reduced an important sink for CO₂; f. increased temperatures have caused melting of land ice leading to changes to polar habitats/decreasing species ability to survive OR - melting of ice/snow causes reduction in albedo, so there is more insolation absorbed at Earth's surface; g. warmer surface water prevents upwelling of nutrients/decreases ocean productivity; h. coral reef habitat destruction due to changes in water pH / temperature; i. warmer temperatures/decreased snowfall has led to droughts and loss of life/habitats; j. rates of decomposition of peat/organic matter increases greenhouse gases; k. ocean/sea level rise from melting ice/thermal expansion of oceans has impacted coastal regions/loss of land; l. changing weather patterns due to global warming has caused loss of life and infrastructure; m. poleward migrations/migrations to more suitable places due to climate changes at lower latitudes;		7 max

Mark-scheme answers

Biology SL | Paper 1A | Nov 2025 TZ1 | Q30 | 1 marks

30. A

Biology SL | Paper 1A | Nov 2025 TZ3 | Q29 | 1 marks

29. A