

APOLLO

Homeostasis

HL

Biology

First assessment 2025

7 questions | mark schemes

Mark-scheme answers

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

30. C

Biology HL | Paper 1A | May 2025 TZ3 | Q32 | 1 marks

32. C

8.	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 transport of water 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 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
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Question		Answers	Notes	Total
8	b	<i>Melting of ice:</i> a. can cause loss of habitat; b. can cause loss of breeding grounds /loss of food sources; c. polar bears/walruses/arctic foxes/ snowy owls/reindeer/other example of species affected; <i>Changes in ocean current:</i> d. may prevent nutrient upwelling / stop nutrients rising to the surface; e. lowers the growth of phytoplankton / ocean primary production; f. disrupts energy flow/food chains/migration patterns of aquatic species;		4 max
8	c	a. negative feedback loops maintain <u>homeostasis</u>/return variables to an original set point if levels are increased or decreased; b. osmoreceptors in the hypothalamus detect if body/blood is dehydrated/hypertonic/solute concentration is too high; c. ADH is secreted if body/blood is dehydrated/hypertonic; d. (ADH is released) from the pituitary; e. (ADH) increases/stimulates more aquaporins / aquaporins open in the collecting duct; f. collecting duct more permeable to water/reabsorbs more water (from filtrate/urine); g. more water is reabsorbed into the blood / blood solute concentration reduced; h. less water lost in urine / smaller volume of (more concentrated) urine; i. increases the concentration of water/ water potential in blood/decreases the concentration of blood/plasma; j. negative feedback / less/no ADH secreted when blood solute concentration returns to normal;		7 max

Question		Answers	Notes	Total
9	a	a. (substitution mutation) caused by mutagen/errors in DNA replication/chemicals/radiation; b. occurs randomly when one nucleotide/base is replaced by another OR a single codon in a gene is altered; c. no consequences if (mutation) occurs to a non-coding portion of DNA /results in a same-sense or silent mutation /new codon codes for the same amino acid (degeneracy/redundancy); d. (consequences may occur if) one amino acid in the polypeptide is replaced by another; e. resulting in the protein/polypeptide being wrongly coded/not functioning/shortened/3 dimensional protein structure changed; f. mutations in germ cells or gametes may pass on to offspring OR mutations in somatic cells may lead to cancer; g. valid example;		4 max

Question			Answers	Notes	Total																																				
9	b		<table><thead><tr><th></th><th>Mitosis</th><th>Meiosis</th><th></th></tr></thead><tbody><tr><td>a.</td><td>maintains chromosome number/diploid;</td><td>halves chromosome number/haploid</td><td>;</td></tr><tr><td>b.</td><td>for growth/repair</td><td>for gamete production</td><td>;</td></tr><tr><td>c.</td><td>in somatic cells</td><td>in reproductive/sex/gamete cells</td><td>;</td></tr><tr><td>d.</td><td><u>one division</u></td><td><u>two divisions</u></td><td>;</td></tr><tr><td>e.</td><td>no exchange of genetic material between chromosomes/crossing over;</td><td>exchange of genetic material between chromosomes/crossing over</td><td>;</td></tr><tr><td>f.</td><td>results in two cells</td><td>results in 4 cells</td><td>;</td></tr><tr><td>g.</td><td>only divides chromatids/ chromatids separate during anaphase</td><td>also divides <u>homologous chromosomes/ homologous chromosomes</u> separate during anaphase 1 and (sister) chromatids separate during anaphase 2</td><td>;</td></tr><tr><td>h.</td><td>genetically identical</td><td>genetically different</td><td>;</td></tr></tbody></table>		Mitosis	Meiosis		a.	maintains chromosome number/diploid;	halves chromosome number/haploid	;	b.	for growth/repair	for gamete production	;	c.	in somatic cells	in reproductive/sex/gamete cells	;	d.	<u>one division</u>	<u>two divisions</u>	;	e.	no exchange of genetic material between chromosomes/crossing over;	exchange of genetic material between chromosomes/crossing over	;	f.	results in two cells	results in 4 cells	;	g.	only divides chromatids/ chromatids separate during anaphase	also divides <u>homologous chromosomes/ homologous chromosomes</u> separate during anaphase 1 and (sister) chromatids separate during anaphase 2	;	h.	genetically identical	genetically different	;		4 max
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9	c	a. <u>transcription factors</u> bind to DNA and can be activators or repressors OR <u>transcription factors</u> promote or block transcription; b. protein/transcription factor/TF binds to <u>promoter</u> to activate transcription OR <u>promoter</u> indicates where RNA polymerase binds to begin transcription; c. transcription factor/activator/protein binds to <u>enhancer</u> to increase the rate of transcription OR transcription factor/repressor/protein binds to <u>silencer</u> to decrease the rate of transcription; d. epigenetic tags can alter gene expression / methylation can alter gene expression; e. methylation of cytosine in the DNA of a promoter represses transcription; f. methylation of amino acids/protein in histones can cause transcription to be repressed or activated; g. thereby regulating the production of proteins from the gene OR proteins from gene expression display/create phenotypic traits; h. gene expression may be altered by (steroid) hormones/biochemicals that act as chemical signals to activate receptors that promote transcription; i. alteration of methyl tags on DNA in response to air pollution or in response to the environment; j. valid example of gene regulation;		7 max

Question		Answers	Notes	Total
10	a	a. organelles perform specialized functions that integrate/work together OR organelles are adapted to perform isolated tasks that coordinate; b. nucleus makes the messenger RNA which codes for the protein; c. ribosome reads the messenger RNA (mRNA) sequence / uses the mRNA to synthesize the protein / performs translation using mRNA; d. (ribosomes embedded) <u>rough</u> Endoplasmic Reticulum/<u>RER</u> synthesizes proteins for secretion out of the cell; e. RER transports proteins within the cell in vesicles/ forms vesicles around proteins for transport to golgi; f. Golgi apparatus where proteins are processed/modified/packaged for secretion; g. vesicles secrete proteins from the cell/fuse with membrane, release by exocytosis;		4 max
10	b	a. the <u>external</u> intercostal muscles contract and the <u>internal</u> intercostal muscles relax; b. this causes the ribs to move upwards/outwards; c. diaphragm contracts / moves downwards/flattens; d. abdominal muscles relax; e. the chest cavity / thorax expands/ volume of thorax increases; f. reducing pressure in the thorax/chest cavity/lung (allowing air to enter);		4 max

Question			Answers	Notes	Total
10	c		a. adaptive immunity is the response to a specific antigen/pathogen; b. macrophage/phagocyte/phagocytic white blood cell ingests/engulfs antigen and displays in/on plasma membrane; c. helper T-cells bind to antigen / activated by antigens presented (on macrophage); d. helper T-cells activate specific B-cells/B lymphocytes that can produce an effective antibody; e. B-cells to divide by mitosis to make clones for more/large numbers plasma cells; f. B-lymphocytes/plasma cells make antibodies /antibodies are specific to an antigen; g. antibodies fight disease-causing organisms/viruses/bacteria (by lysis, agglutination,neutralization, tagging, other verified action.); h. some plasma cells become (inactive) <u>memory cells</u> (that are retained in the body); i. memory cells can be activated/quickly respond to produce antibodies in the case of reinfection;		7 max

Mark-scheme answers

Biology HL | Paper 1A | Nov 2025 TZ1 | Q32 | 1 marks

32. C

Biology HL | Paper 1A | Nov 2025 TZ3 | Q31 | 1 marks

31. D

9.	a	a. <u>complementary base pairing</u> (between DNA nucleotides); b. adenine pairs with thymine and cytosine pairs with guanine; c. new strands with same/correct sequence/copy produced by <u>semiconservative replication</u> OR <u>semiconservative replication</u> is using a template strand (to make a new strand); d. DNA polymerase (III) adds <u>nucleotides</u> to the growing chain/to the template strand; e. <u>proofreading</u> is correction of errors/mutations (during DNA replication) f. <u>proofreading</u> by <u>DNA polymerase III</u> OR error in replication/nucleotide with mismatched base detected by <u>DNA polymerase III</u> g. <u>DNA polymerase III</u> has 3' to 5' exonuclease activity OR <u>DNA polymerase III</u> reverses and excises nucleotide OR (mismatched) <u>nucleotide</u> removed and replaced (by DNA polymerase III);		4 max
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Question		Answers	Notes	Total
9.	b.	a. pancreas cells monitor blood glucose concentrations; b. glucagon secreted by alpha cells and insulin by beta cells; c. glucagon/insulin/hormones secreted into/transported by bloodstream; d. insulin secreted when glucose concentration rises/is high; e. insulin stimulates uptake of glucose by liver/muscle/body cells; f. insulin stimulates conversion of glucose to glycogen (in liver/muscle cells); g. insulin stimulates body cells to use glucose instead of fat in cell respiration; h. glucagon secreted when glucose concentration falls/is low; i. glucagon stimulates breakdown of glycogen to glucose (by liver/muscle cells); j. negative feedback (is used to regulate blood glucose concentration);		7 max
9.	c.	a. isotonic is same water potential/solute potential/osmotic potential/solute concentration; b. (isotonic conditions) prevent (net) movement of water by <u>osmosis</u>; c. hypotonic plasma/tissue fluid causes water entry to blood/body cells; d. swelling/bursting of cells in (hypotonic plasma/tissue fluid); e. hypertonic plasma/tissue fluid causes water to exit cells; f. shrinkage/crenation/loss of volume/OWTTE; g. blood cells bathed in plasma; h. tissue fluid released by capillaries and then reabsorbed/flows between cells in tissues;	<i>In mark point c and mark point e accept 'higher/less negative water potential' instead of hypotonic and accept 'lower/more negative water potential' instead of hypertonic.</i>	4 max

Mark-scheme answers

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

30. C