

1(a)	<i>any two from:</i> allow oras 1 cilium composed of microtubules or microvillus, composed of microfilaments / contains actin (filaments) ; 2 cilium 9+2 (microtubule) arrangement ; 3 cilium has basal body ; A has centrioles at the base 4 cilium shows synchronous, rhythm / movement ; A whip-like / rhythmic, movement 5 cilium, moves / wafts, mucus or microvillus increases, surface area / SA, for, absorption / uptake / secretion ; A increases SA to locate transport proteins AW 6 AVP ; e.g. cilium has dynein (arms) cilium is, longer (10 μm) / wider (0.2 μm) or microvillus is, shorter (1 μm) / narrower (90 nm)
1(b)	<i>any one from:</i> protects (intestinal), epithelium / cells / lining ; A examples of protection e.g. damage from stomach acid / digestion by enzymes A less likely for epithelial cells to be damaged / AW A traps, pathogens or (harmful), bacteria / microbes / microorganisms I dust A prevents, pathogens / AW, from reaching cells eases / reduces friction for, movement of, gut contents / substances (through digestive system) ; habitat / nutrient source, for gut, microorganisms / flora ; AW AVP ; e.g. location for immune system cells R if stated as being in the gas exchange system
1(c)(i)	arteriole ; A (small) artery
1(c)(ii)	<i>any two from:</i> (at arteriole end of capillary) high, <u>hydrostatic</u> / <u>blood</u>, pressure ; A ref. to hydrostatic pressure gradient (ultra)filtration / described ; e.g. fluid / plasma / water <u>and</u> solutes, forced / comes out of, capillaries / blood glucose / amino acids / ions, leave (blood) or (large / plasma) proteins remain (in blood) ; R if stated, red blood cells / platelets, leave through, fenestrations / fenestrae / endothelial pores or pores / gaps / spaces, in, capillary wall / endothelium / between cells ;
1(d)	<i>any three from:</i> <i>after, secreted / released, by enteroendocrine cells</i> transport of, peptide / GLP-1 / ligand, in, blood / circulation ; to, <u>target cells</u> (which are cells of the, stomach / pancreas) ; binding of, peptide / GLP-1 / ligand, to receptor ; <i>context can be cell surface membrane or intracellular</i> <i>ref. to, specificity / complementary ; must be in correct context of GLP-1 binding to receptor</i> (binding) triggers / sets off / AW, events within (target) cell (leading to the response) ; A examples e.g. signal transduction / triggers enzyme cascade
1(e)(i)	prophase metaphase anaphase telophase } ; R if interphase or cytokinesis stated

1(e)(ii)	any three from: presence of, vesicles / vacuoles, qualified ; e.g. many / secretory / Golgi <i>ref. to nucleus / nucleolus, is neutral</i> A storage vesicles correct <i>ref. to</i> exocytosis ; A fusion of, vesicle / vacuole, with <u>cell surface membrane</u> much / high proportion of / a lot of / AW, <u>rough endoplasmic reticulum</u> ; I ER / RER / rough ER A many ribosomes rough endoplasmic reticulum / ribosomes, site of, peptide / polypeptide / protein / enzyme, synthesis ; ecf for abbreviating <u>rough endoplasmic reticulum</u> previously AVP ; e.g. presence of mitochondria to provide, ATP / energy, for, protein synthesis / movement of vesicle to cell surface membrane / exocytosis <i>mp2 can also be awarded here only if ref. has been made within response to vesicles / vacuoles</i>
1(e)(iii)	Paneth cell is, differentiated / specialised (for, secretion / its function) or stem cells are, undifferentiated / not differentiation / not specialised ;

5(a)	<table><tr><th>feature</th><th>ADH</th><th>glucagon</th><th>insulin</th><th></th></tr><tr><td>binds to receptors on cell surface membranes</td><td>✓</td><td>✓</td><td>✓</td><td>;</td></tr><tr><td>results in molecules moving from cells into the blood</td><td>✓</td><td>✓</td><td>x</td><td>;</td></tr><tr><td>is secreted as a result of detection by osmoreceptors</td><td>✓</td><td>x</td><td>x</td><td>;</td></tr></table>	feature	ADH	glucagon	insulin		binds to receptors on cell surface membranes	✓	✓	✓	;	results in molecules moving from cells into the blood	✓	✓	x	;	is secreted as a result of detection by osmoreceptors	✓	x	x	;
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5(b)	any four from: 1 impulses / action potentials / neurotransmitters, in nervous system <u>and</u> hormones in endocrine system ; 2 electrical in nervous system <u>and</u> chemical in endocrine system ; 3 neurones / nerve cells, in nervous system <u>and</u> blood in endocrine system ; 4 effects are / target is, specific / localised, in nervous system <u>and</u> (can be) widespread in endocrine system ; 5 effect / response, happens quickly in nervous system and slowly in endocrine system ; 6 effect / response, lasts a short time in nervous system <u>and</u> long time in endocrine system ; 7 AVP ;																				
5(c)(i)	C ;																				
5(c)(ii)	B ;																				
5(c)(iii)	1 (D / it), shortens / contracts / decreases ; and any three from: 2 calcium ions / Ca²⁺, bind to troponin ; 3 tropomyosin, moves / shifts position / exposes binding sites on actin ; 4 myosin (head) binds to actin / myosin-actin cross-bridges form ; 5 power stroke / myosin head, pulls actin ; 6 more actin, enters / overlaps with, A band / B or more overlap between actin and myosin ;																				

9(a)	(X =) (renal) pelvis ; (Y =) medulla ;
9(b)	<i>any four from:</i> 1 glucose oxidase (present / immobilised, in sensor / on strip) ; 2 glucose → hydrogen peroxide ; 3 hydrogen peroxide (oxidised) → oxygen / electrons ; 4 (magnitude of) e ⁻ flow / current / voltage, (generated) is proportional to, hydrogen peroxide / glucose, concentration ; 5 digital / numerical / quantitative, reading / result / value (on screen) ; 6 AVP ;