1(a)	*any **two** from:* *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)	*any **one** from*: 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)	*any **two** from:* (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)	*any **three** from*: *after, secreted / released, by enteroendocrine cells* 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 **;** *context can be cell surface membrane or intracellular* *ref. to*, specificity / complementary **;** *must be in correct context of GLP-1 binding to receptor* (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*: *ref. to nucleus / nucleolus, is neutral* presence of, vesicles / vacuoles, qualified **;** e.g. many / secretory / Golgi **A** storage vesicles correct *ref. to* 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 rough endoplasmic reticulum previously* AVP **;** e.g. presence of mitochondria to provide, ATP / energy, for, protein synthesis / movement of vesicle to cell surface membrane / exocytosis *mp2 can also be awarded here **only** if ref. has been made within response to vesicles / vacuoles*
1(e)(iii)	Paneth cell is, <u>differentiated / specialised</u> (for, secretion / its function) **or** stem cells are, <u>undifferentiated / not differentiation</u> / not specialised **;**

5(a)	

feature	ADH	glucagon	insulin	
binds to receptors on cell surface membranes	✓	✓	✓	;
results in molecules moving from cells into the blood	✓	✓	×	;
is secreted as a result of detection by osmoreceptors	✓	×	×	;

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 / Ca^{2+}, 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)	*any **four** from*: **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 **;**