## *QUESTIONSHEET 1*

(a) A = nucleus; B = ribosome/RER; C = (RER) vesicle; D = Golgi body; **4**

(b) (i) (nucleus) contains DNA which codes for the enzyme;
DNA code is transcribed to messenger RNA; **2**

(ii) mRNA attaches to ribosomes;
code on mRNA translated into the polypeptide; **2**

(iii) polypeptide is transported through cell to Golgi body; (allow 1 mark for 'package the enzyme')
in vesicle of rough endoplasmic reticulum; **2**

(iv) polypeptides in Golgi body combined/modified to form enzyme;
carried in Golgi vesicles to cell surface;
for secretion/exocytosis; **max 2**

**TOTAL 12**

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## *QUESTIONSHEET 2*

(a) Labels: mitochondrion;
microvilli/brush border; **2**

(b) microvilli/brush border increases surface area;
for uptake of glucose/enables greater uptake of glucose/ref to larger amount of carrier protein present; **2**

mitochondria provide ATP;
for active transport of glucose (into intercellular fluid); **2**

**TOTAL 6**

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## *QUESTIONSHEET 3*

(a) (i) autonomic neurone would be non - myelinated; **1**

(ii) sensory neurone would have the cell body attached to the centre of the fibre; **1**

(b) (i) speed up impulse;
by saltatory conduction;
electrons/local currents jump from node to node; **3**

(ii) composed of polyribosomes;
synthesise enzymes involved in transmitter production/recognition proteins for synapse formation; **3**
eg. synthesis of acetylcholine/noradrenaline/any other correct transmitter substance;

**TOTAL 8**

## *QUESTIONSHEET 4*

(a) A = double membrane; B = starch grain; C = granum/grana; D = stroma; E = lipid droplet; **5**

(b) (i) granum/thylakoid membranes/quantosomes; **1**

(ii) stroma; **1**

(c) Any three of:
both have double outer membrane/
large internal surface area/many internal membranes/
contain DNA/ribosomes/
contains lipid droplets;;; **3**

(d) (i) in mitochondria catalyses oxidative phosphorylation;
in chloroplasts catalyses (cyclic/noncyclic) photophosphorylation; **2**

(ii) enables both to synthesise proteins/polypeptides; **1**

**TOTAL 13**

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## *QUESTIONSHEET 5*

| | Process | | |
|---|---|---|---|
| Description | Simple Diffusion | Facilitated Diffusion | Active Transport |
| Is ATP required | | No; | Yes; |
| Are protein carrier molecules involved? | | Yes; | |
| Direction of transport is down concentration gradient | Yes; | | No; |

**TOTAL 5**

## *QUESTIONSHEET 6*

A - ribosome manufacture/synthesis of ribosomal RNA;

B - mitochondria;

C - increase surface area for attachment of enzymes/for electron transfer chain/oxidative phosphorylation;

D - lysosomes;

E - lipid/steroid synthesis/transport; **TOTAL 5**

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## *QUESTIONSHEET 7*

| Feature | Bacterial cell | Liver cell | Palisade cell | |
|---|---|---|---|---|
| Nuclear membrane | × | ✓ | ✓ | ; |
| Vacuole | × | × | ✓ | ; |
| Cell wall | ✓ | × | ✓ | ; |
| Microvilli | × | ✓ | × | ; |
| Chloroplasts | × | × | ✓ | ; |
| Mesosomes | ✓ | × | × | ; |
| Glycogen granules | ✓ | ✓ | × | ; |

**TOTAL 7**

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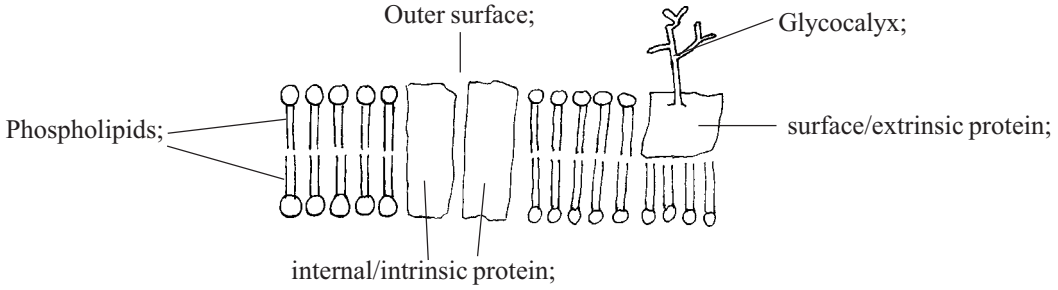
## *QUESTIONSHEET 8*

(a) (i) and (ii) correct orientation of phospholipids;
bilayer;
correct orientation of protein; **3**




**5**

(b) Any two of: transport/ receptors/recognition/ attachment sites/ enzymes;; **2**

(c) (i) diffusion;
down concentration gradient;
as hydrogen carbonate ions/as dissolved $CO_2$; **max 2**

(ii) either: facilitated diffusion;
glucose binds to carrier/protein;
protein changes shape/carries glucose across;

or: active transport;
glucose binds to carrier/protein;
energy or ATP required;
protein changes shape/carries glucose across;
ref. needs $Na^+$ to be carried at the same time; **max 2**

**TOTAL 14**

## *QUESTIONSHEET 9*

(a) A = outer membrane; B = inner membrane; C = ribosomes; D = crista; E = DNA; **5**

b) (i) cristae;
(ii) matrix; **2**

(iii) synthesises proteins/polypeptides;
e.g. enzymes; **2**

(b) XY = 112 mm = 112,000 μm; (this distance may be altered by photocopying- adjust figures accordingly)
$\frac{112,000}{130,000}$ = 0.86 μm; **2**

**TOTAL 11**

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## *QUESTIONSHEET 10*

(a) A. Golgi body; D. double nuclear membrane;
B. centriole; E. mitchondrion;
C. nucleolus; F. rough endoplasmic reticlum; **6**

(b) (i) Any three of:
presence of many mitochondria/
large rough ER with ribosomes/
presence of microvilli/Golgi body
large nucleus;;; **3**

(ii) presence of much smooth endoplasmic reticulum; **1**

**TOTAL 10**

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## *QUESTIONSHEET 11*

(a) range 7 - 10 nm; **1**

(b) (i) glycocalyx;
(ii) intrinsic/integral/internal protein;
(iii) phospholipid bilayer; **3**

(c) (i) lipids/proteins can move laterally/change places; **1**

(ii) 1. exocytosis: when material is passed out from the cell using a vesicle;
endocytosis: is the uptake of material into the cell by forming a vesicle with the plasma membrane; **2**

2. phagocytosis takes solid material into the cell;
pinocytosis takes fluid into the cell; **2**

**TOTAL 9**

## *QUESTIONSHEET 12*

(a) protein; **1**

(b) 7.0 –10 nm; **1**

(c) shape of receptor site is specific to growth hormone/only growth hormone fits; **1**

(d) receptor damaged/mutation affects protein;
unable to recognise/bind with growth hormone; **2**

**TOTAL 5**

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## *QUESTIONSHEET 13*

(a) facilitated;
rate of transport levels off;
when number of solute molecules exceeds number of carriers/proteins; **3**

(b) Any two of: concentration gradient/difference/
size/shape of molecule/
polarity of molecule/
temperature;; **2**

(c) active transport/use of ATP;
sodium/chloride pumps move ions out;
cannot re-enter because cell membrane is impermeable to these ions; **3**

**TOTAL 8**

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## *QUESTIONSHEET 14*

(a) (i) A = basement membrane; B = nucleus; C = mucous goblet cell; D = cilia; E = (layer of) mucus; **5**

(ii) Any two of: bronchial tree/oviduct/vas deferens;; **2**

(iii) D. beat to move material along; beat rhythmically;
E. can trap dust/dirt in bronchial tree/ medium for cilia to beat in; **3**

b) (i) in a simple epithelium all cells touch the basement membrane;
in a compound epithelium there are several cell layers/only the lower cells touch the basement membrane; **2**

(ii) transitional; bladder/ureter;
stratified/compound squamous;
skin/buccal cavity/rectum/vagina; **4**

**TOTAL 16**

## *QUESTIONSHEET 15*

(a) (i) A = plasma membrane; B = cell wall; C = nuclear mass; D = mesosome; E = ribosomes; **5**

(ii) contain the enzymes for respiration/cell wall synthesis; **1**

(iii) coccus; **1**

(b) prokaryotic cells contain no membrane-bound organelles, eukaryotes do;
prokaryote cells have no nuclear membrane, eukaryotes do/prokaryotes have a nuclear mass;
eukaryotes have a nucleus/prokaryotes have one long chromosome, eukaryotes have many chromosomes;
prokaryotes have no nucleoli, eukaryotes do;
prokaryotic cell walls contain murein, eukaryotic cell walls (if present) contain cellulose;
prokaryotes contain 70S ribosomes, eukaryotes contain 80S ribosomes; **max 3**

**TOTAL 10**

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## *QUESTIONSHEET 16*

(a) (i) A = xylem; B/C = phloem; **2**

(ii) A = vessel; B = companion cell; C = sieve tube; **3**

(iii) D = sieve plate; **1**

(b) (i) no contents/hollow to allow easy passage of water/salts;
no end cell walls so no blockage to passage of water/salts;
pits in wall allow lateral passage of water/salts;
lignified wall gives strength to support the plant/prevent collapse of vessel when under transpiration pull; **max 3**

(ii) B has a nucleus, C does not;
B has dense cytoplasm, C has peripheral cytoplasm (or equivalent)/C has a vacuole/B does not;
C has a sieve plate, B does not; **max 2**

(c) length between lines = 51 mm (allow range 50.5 - 51.5);

$\frac{51}{750}$ ; (this distance may be altered by photocopying- adjust figures accordingly)

= 0.068 mm; **3**

(0.067 mm - 0.069 mm) (allow consequential error if length measured incorrectly)

**TOTAL 14**

## *QUESTIONSHEET 17*

(a) (i) parenchyma; **1**

(ii) packing tissue/supporting tissue/storage tissue; **1**

(iii) isodiametric cells;
allows tight packing;
thin cell wall;
transmission of turgidity/vacuole allows development of turgidity;
contains starch grains; **max 3**

(b) (i) phloem; **1**

(ii) A = sieve tube; B = companion cell; C = sieve plate; **3**

(iii) transport of organic solutes/amino-acids/sugars/equivalent; **1**

(iv) sieve plate has perforations (to allow passage of solutes);
plasmodesmata pass through sieve plate from cell to cell;
sieve tubes elongated for easier transport;
sieve tubes lose nucleus/most organelles, so transport easier through cytoplasm;
companion cell regulates action of sieve tubes; **max 3**

**TOTAL 13**

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## *QUESTIONSHEET 18*

(a) (i) A = <u>rough</u> endoplasmic reticulum; B = vesicles <u>from rough ER</u> (not Golgi vesicles);
C = Golgi body; D = plasma/cell membrane; **4**

(ii) to transport polypeptides/proteins from the rough ER to the Golgi body; **1**

(iii) it assembles polypeptides into proteins;
may combine the protein with lipid/carbohydrate/nucleic acid/metal ions/any correct example;
to synthesise enzymes/some hormones/mucus/other correct example;
packages secretion into vesicles and releases these to the cytoplasm; **max 3**

(b) (i) plasma cell/lymphocyte;
antibodies; **2**

(ii) HCl in gastric juice/sweat/sebum/named hormone/any valid example;
oxyntic cell/stomach cell/sweat gland cell/sebaceous gland cell/correct endocrine cell/cell must be appropriate to the example;
**2**

(iii) the stored secretion may be an enzyme or hormone which could adversely affect the cell if free (in the cytoplasm);
thus it is isolated within a phospholipid membrane; **2**

(iv) stimulation by a hormone/nerve impulse; **1**

**TOTAL 15**

## *QUESTIONSHEET 19*

(a) (i) A = rough endoplasmic reticulum; B = vesicles from rough ER;
C = Golgi apparatus/body: D = mitochondrion; **4**

(ii) contain digestive/hydrolytic enzymes;
eg. protease/peroxidase/acid phosphatase;
keep the enzymes in membranes, thus segregated from the cytoplasm/prevent enzymes from damaging the cytoplasm;
concerned with digesting/recycling phagocytosed material/aged organelles; **max 3**

(iii) receives polypeptides from rough ER via vesicles;
assembles them into enzymes;
packages them in lipoprotein membrane;
'buds' them off as primary lysosomes; **max 3**

(b) (i) primary lysosome has budded off from Golgi body and is unmodified;
secondary lysosome is formed when the primary lysosome fuses with an autophagic vesicle/phagosome; **2**

(ii) an autophagic vesicle will absorb an aged organelle/mitochondrion;
when fused with the primary lysosome the aged organelle will be broken down/recycled; **2**

a phagosome takes in solid material by phagocytosis/engulfing;
the solid material is broken down when the phagosome fuses with a primary lysosome; **2**

the residual body contains the remains of the digested organelle/phagocytosed material;
will return products of digestion/amino acids to the cytoplasm for reuse; **2**

**TOTAL 18**

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## *QUESTIONSHEET 20*

(a) (i) increases surface area/value of A;
if A is increased then J is increased;
thus more absorption per unit time; **3**

(ii) (if membrane is thin) $\Delta x$ is small;
thus J is large;
thus more absorption per unit time; **3**

(b) (i) provide ATP;
for active transport;
to maintain/work against concentration gradient; **3**

(ii) ref. cholesterol will mix with water and allows passage of some water soluble substances;
will accelerate diffusion/entry of non-polar substances;
e.g. oxygen/carbon dioxide; **max 2**

**TOTAL 11**