OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced Subsidiary GCE

Unit **F211:** Cells, Exchange and Transport

Mark Scheme for June 2011

Oxford Cambridge and RSA Examinations

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Question			Expected Answer	Mark	Additional Guidance
1	(a)	(i)	production of vesicles / packaging proteins ; modification of / processing of / adding carbohydrate to , proteins ; production of lysosomes ;	max 1	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** lipids **IGNORE** ref to transport / secretion / exocytosis / substances / materials **DO NOT CREDIT** stores proteins **ACCEPT** makes glycoproteins
1	(a)	(ii)	allow movement (of substances) in or out of nucleus ; correctly named substance (entering or leaving nucleus) ; ref to correct destination of substance ;	max 2	**IGNORE** messages / information / communication **IGNORE** name of substance for MP 1 **IGNORE** ref to mechanism of movement e.g. RNA / (m)RNA / (r)RNA (t)RNA / polymerase / nucleotides / ribosomes / helicase / proteins / (steroid) hormones **IGNORE** ref nutrients **DO NOT CREDIT** if incorrect direction of movement described (e.g. RNA into nucleus **or** RNA in and out of nucleus) **DO NOT CREDIT** DNA as named substance ***Note*** 'allows mRNA out of nucleus' = **two marks** e.g. RNA to ribosomes or RER helicase to DNA polymerase to , DNA / gene nucleotides to DNA (steroid) hormones to , DNA / gene / chromosome

Question			Expected Answer	Mark	Additional Guidance
1	(a)	(iii)	contain / release **,** lysins / lytic enzymes / hydrolytic enzymes / digestive enzymes **;**		**DO NOT CREDIT** 'engulf' **DO NOT CREDIT** 'lysosomes are digestive enzymes'
			digest / break down **,** organelles / foreign objects / toxins / cells / pathogens **;**		**ACCEPT** destroy **ACCEPT** ref to digestion of contents of phagocytic vesicle **IGNORE** ref to (unwanted) substances / materials / food **IGNORE** ref to acrosomes
			apoptosis / autolysis / described **;**	**max 1**	
1	(b)		*idea of* more than one (type of) tissue **;**		**ACCEPT** named examples of tissues
			working together / performing a function(s) **;**	**2**	**ACCEPT** job or task

Question	Expected Answer	Mark	Additional Guidance
1 (c)			allow **F** marks even if **C** mark not quite accurate
	C1 thin / **squamous**, **<u>epithelium</u>** ; **C2** thin **<u>endothelium</u>** (of capillary) ;		**C1/C2** **IGNORE** ref to alveolus / alveolar wall / capillary wall **,** without ref to epithelium / endothelium
	F1 (provides) short **diffusion** distance / described ;		**F1** **ACCEPT** diffusion barrier **,** thin / one cell thick **IGNORE** refs to speed or rate of diffusion **IGNORE** ref to reduces diffusion distance alone – must be in context of short distance **DO NOT CREDIT** ref to thin **,** cell walls / membranes
	F2 ref to **surfactant** (from epithelial cells) **,** reducing surface tension / preventing alveoli collapsing ;		**F2** **IGNORE** ref to moisture
	C3 blood / red blood cells / **erythrocytes** ;		**C3** **IGNORE** (named) blood vessel **ACCEPT** blood supply / supply of blood
	F3 transports (named) gas(es) **,** to / from **,** exchange surface / alveoli ; **C4** diaphragm / intercostals **, muscles** ;		**F3** **IGNORE** ref to lungs **IGNORE** description of gas exchange
	F4 (maintains / creates) **diffusion** / **concentration , gradient** ;		**F4** This can be awarded in context of **F3** or **C4**
	C5 **ciliated** epithelium / **goblet** cells / ciliated cells ; **F5** *idea of:* protection from / removal of **,** dust / bacteria / pollen / spores ;		**F5** **ACCEPT** trap **,** dust / bacteria / pollen / spores **IGNORE** dirt / germs
	C6 **cartilage** ; **F6** hold airway open ;		
	C7 smooth **muscle** ;		***continued***

Question	Expected Answer	Mark	Additional Guidance
continued			
	F7 constrict / control diameter of **,** airway / blood vessel **;**		**F7** **ACCEPT** narrows lumen
	C8 elastic , fibres / tissue **;** **F8** for recoil / aiding ventilation **;**		**C8** **IGNORE** elastin / elasticated **F8** **ACCEPT** prevent alveoli bursting
	C9 **macrophage** / **neutrophil** **;** **F9** engulf / destroy pathogens **or** protect from infection **;**	**max 4**	**C9** **IGNORE** ref to white blood cell unqualified
	QWC **;**	**1**	Any **three** with correct spelling and a suitable context from: **epithelium / epithelial**, **endothelium,** **cartilage,** **diffuse / diffusion,** **gradient,** **goblet,** **ciliated,** **concentration,** **squamous,** **macrophage,** **neutrophil,** **surfactant,** **muscle,** **erythrocyte**
	Total	**[11]**	

Question			Expected Answer	Mark	Additional Guidance
2	(a)		phospholipids ; proteins ; glycoproteins ; cholesterol ; glycolipids ;	max 3	**Mark the first <u>three</u> components in continuous prose or first suggestion in bullet point / (numbered) list.** **IGNORE** lipids, bilayer, hydrophilic head, hydrophobic tail, ref to intrinsic / extrinsic Count all refs to different types of protein as one e.g. intrinsic protein ✓ extrinsic protein Ignore pore protein Ignore glycoprotein ✓ phospholipids ✓ **= 3 marks**
2	(b)	(i)	(movement of substances) against / up , concentration gradient **or** from low to high concentration ; using , ATP / (metabolic) energy ; using a , transport / carrier , protein ;	2	**CREDIT** diffusion gradient for concentration gradient **DO NOT CREDIT** along / across , concentration gradient **DO NOT CREDIT** 'diffusion against concentration gradient' **DO NOT CREDIT** pore / channel protein

<table>
<tr><th colspan="3">Question</th><th>Expected Answer</th><th>Mark</th><th>Additional Guidance</th></tr>
<tr><td>2</td><td>(b)</td><td>(ii)</td><td>(mineral) ions / salts / named e.g, (into) root hair (cell) ;

hydrogen ions (out of) companion cells ;

(mineral) ions / salts / named e.g, (across) endodermis ;
sucrose out of sieve tube at sink ;

AVP ; ;</td><td>max 2</td><td>Mark the first <u>two</u> examples.
Ensure candidate refers to ions e.g. nitrates, phosphates, calcium ions, magnesium ions etc.
ACCEPT correct symbols with charge
DO NOT CREDIT ref to water
ACCEPT ref to loading of sucrose into , phloem cell / companion cell
ACCEPT ref to uptake of glucose by cells lining , (small) intestine / nephron / PCT
IGNORE references to endocytosis / exocytosis / phagocytosis / secretion
DO NOT CREDIT incorrect direction of movement if stated
e.g.
<table>
<tr><th>substance</th><th>cell</th><th>(direction)</th></tr>
<tr><td>sodium/potassium ion(s)</td><td>neurone</td><td>K^+ in
Na^+out</td></tr>
<tr><td>sodium/potassium ion(s)</td><td>named cell</td><td>Ion pump to drive cotransport</td></tr>
<tr><td>potassium ion(s)</td><td>guard cell (to open stomata)</td><td>in</td></tr>
<tr><td>sodium ion(s)</td><td>cell of loop of Henle</td><td>out</td></tr>
<tr><td>calcium <u>ion</u>(s)</td><td>muscle cell</td><td>(into sarcoplasmic reticulum)</td></tr>
<tr><td>calcium ions</td><td>presynaptic knob</td><td>out</td></tr>
<tr><td>hydrogen ions</td><td>in cell , respiring (aerobically) / photosynthesising</td><td>for chemiosmosis</td></tr>
<tr><td>named ion(s)</td><td>cells lining distal convoluted tubule</td><td>in / out</td></tr>
</table></td></tr>
<tr><td>2</td><td>(c)</td><td></td><td>osmosis ;
<u>facilitated</u> <u>diffusion</u> ;
diffusion ;</td><td>3</td><td>Mark the first answer for each example. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>[10]</td><td></td></tr>
</table>

Question			Expected Answer	Mark	Additional Guidance
3	(a)	(i)	**X** = right atrium **;** **Y** = aorta **;** **Z** = (left) pulmonary artery **;**	**3**	**Mark the first answer for each letter.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** right atria **IGNORE** RA **IGNORE** PA
3	(a)	(ii)	*left ventricle* **1** (more muscle to create) more force **;** **2** (needs to create) higher pressure **;** **3** push blood against greater **,** resistance / friction **;** **4** (left ventricle) pumps blood further / pumps blood to all parts of body / supplies systemic circulation **;**	**3 max**	Assume answer refers to left ventricle unless otherwise stated. **ACCEPT ORA** for left atrium throughout **1** **IGNORE** more powerful contraction **ACCEPT** stronger contraction **2** **IGNORE** withstanding or maintaining pressure **4** **ACCEPT** pumps blood **,** all round body / greater distance **IGNORE** pumps blood to the body **DO NOT CREDIT** references to **,** right ventricle / lungs

Question			Expected Answer	Mark	Additional Guidance
3	(a)	(iii)			**DO NOT CREDIT** statements that refer to right atrium or right ventricle
			1 ventricular systole **or** ventricle **,** wall / muscle **,** contracts **;**		**1** **IGNORE** ref to atrial contraction
			2 (ventricular contraction) raises ventricular pressure **;**		
			3 (ventricular pressure) higher than atrial pressure **;**		
			4 *idea of* (pressure / movement of blood, generated by ventricular contraction) pushes valve shut **;**		**4** **DO NOT CREDIT** 'valve shuts' alone **DO NOT CREDIT** in context of blood flowing from atrium to ventricle resulting in pressure increase to close valve
			5 chordae tendinae prevent inversion **;**	**max 2**	**5** **ACCEPT** valve tendons / tendinous cords
	(b)				**Mark the first answer for each role.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then **= 0 marks**
			aorta / (named) artery / arteries / arteriole(s) **;**		**ACCEPT** smooth muscle / elastic tissue / collagen / narrow lumen **DO NOT CREDIT** valves
			blood / plasma **;**		
			capillary / capillaries / capillary wall / (capillary) endothelium **;**	**3**	
			Total	**[11]**	

Question			Expected Answer	Mark	Additional Guidance
4	(a)		(just behind) tip / apex , of root ; (just behind) tip / apex , of shoot ; cambium / pericycle / vascular bundle ; bud ;	max 2	**Mark the first <u>two</u> suggestions.** **ACCEPT** behind root cap **IGNORE** root unqualified **IGNORE** stem / root unqualified / shoot unqualified **ACCEPT** between xylem and phloem
4	(b)	(i)	**1** chromosomes / chromatin / nucleus , can be seen / are visible ; **2** determine / distinguish between , different stages (of mitosis / division / cell cycle) ; **3** (staining) provide contrast (between cell structures) / AW ; **4** (because) different , structures / chemicals , take up different amounts of stain ;	max 2	**IGNORE** ref to organelles throughout **1** **ACCEPT** DNA for chromosomes / chromatin **ACCEPT** chromosomes / chromatin / DNA / nucleus , not normally visible **3** **IGNORE** different structures can be seen (this is visibility not contrast) **4** **IGNORE** different tissues or cells , take up different amounts of stain
4	(b)	(ii)	mitosis / mitotic ;	1	spelling must be correct

Question			Expected Answer	Mark	Additional Guidance
4	(c)		***Two*** *marks for correct answer, even if no working shown* 18.00 **; ;**	**2**	**CREDIT** 18 / 18.0 If answer is incorrect or missing allow one mark for working 100 – 82 **or** 4.34.+ 3.23 + 3.23 + 7.20 **or** 18 somewhere in working
4	(d)		*in meiosis* (cells produced are) not <u>genetically</u> identical **;** one set of chromosomes / haploid **;** (they are) gametes **;** four cells produced **;**	**max 1**	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then **= 0 marks** **IGNORE** ref to cells produced by mitosis (as qu asks about meiosis) **ACCEPT** not clones **Award** in context of genetically different from parent or from each other **ACCEPT** half number of chromosomes / half genetic material
			Total	**[8]**	

Question			Expected Answer	Mark	Additional Guidance
5	(a)	(i)	**1** *idea of* not breathing through nose **;** **2** subject breathes **,** evenly / normally / regularly **;** **3** *idea of* (measure) height / amplitude **,** of waves (from trace) **;** **4** measure at least three waves and calculate mean **;** **5** detail of how spirometer works **;**	**max 3**	**1** e.g. subject wears nose clip / plug or holds nose **2** **IGNORE** at rest **3** **ACCEPT** (measure) difference between peak and trough **ACCEPT** annotated diagram / annotations on graph **5** e.g. as breathe <u>in</u> lid goes <u>down</u> / as breathe <u>out</u> lid goes <u>up</u> e.g. movement of lid recorded **,** on trace / by data logger e.g. pen attached to lid moves up/down as breathe **DO NOT CREDIT** description of water level changing **IGNORE** ref to using mouthpiece, soda lime, oxygen
5	(a)	(ii)	10 further waves drawn with similar heights **;** trace falls **;**	**2**	Look for 10 extra peaks and 10 extra troughs ***Note*** 'similar' means no wave drawn for vital capacity – all waves should be approximately same height

Question			Expected Answer	Mark	Additional Guidance
5	(a)	(iii)	**1** measure **,** volume of oxygen used / decrease in volume in chamber **;** **2** one detail of how to measure volume change **;** **3** measure time taken (to use this oxygen) **;** **4** divide (volume) by time taken **;**	**3**	**1** **ACCEPT** annotations on graph **ACCEPT** **'**measure how much the trace has gone down' **or** 'measure decrease in trace' **2** e.g. draw line along tips of **,** peaks / troughs e.g. find difference in height from one **,** peak / trough **,** to another **3** **ACCEPT** (measure volume of oxygen used) in a given time **4** **ACCEPT** unit stated to indicate rate has been calculated e.g. dm^3s^{-1} / dm^3min^{-1} ***NOTE*** **'**draw line along tips of, peaks / troughs **and** calculate gradient of line' = **3 marks (mark points 1, 3 & 4)**
5	(b)		**1** check health of volunteer **;** **2** oxygen used **;** **3** new / sterilised / disinfected **,** mouthpiece (for each volunteer)**;** **4** *idea of:* soda lime working **;** **5** sufficient oxygen in chamber **;** **6** water level not too high / water must not enter tubes **;** **7** ensure valves working correctly **;**	**max 2**	**Mark the first *two* factors.** **1** e.g. check medical history of volunteer ask about asthma / TB / pneumonia / flu / bronchitis / emphysema **3** **IGNORE** clean mouthpiece **4** **CREDIT** need to remove CO_2 / CO_2 accumulates **5** **IGNORE** enough air in chamber **6** **IGNORE** general ref to leaks
			Total	**[10]**	

Question			Expected Answer	Mark	Additional Guidance
6	(a)	(i)	sucrose ;	1	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**
6	(a)	(ii)	sink ; neither ; sink ;	3	**Mark the first answer for each tissue.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**
6	(b)		**1** elongated elements ; **2** elements **,** joined end to end / form column ; **3** sieve plates / pores in end walls / perforated end plates / sieve pores ; **4** little cytoplasm / cytoplasm pushed to cell edges / thin (layer of) cytoplasm ; **5** no nucleus / few organelles ;	max 2	**Mark the first <u>two</u> adaptations.** **1** **ACCEPT** cells **2** **ACCEPT** cells **3** response must refer to pores at ends of sieve elements **4** **IGNORE** hollow **5** **IGNORE** no organelles / few cell contents

Question			Expected Answer	Mark	Additional Guidance
6	(c)		**1** active transport of, **hydrogen ions** / **protons** / H^+ , out of **companion** cells ; **2** creates , hydrogen ion / **concentration** / diffusion , **gradient** ; **3** **(facilitated) diffusion** (of H^+) back into companion cells ; **4** sucrose / assimilates , move in with hydrogen ions ; **5** by **cotransport** / through cotransport protein ; **6** sucrose / assimilates , (diffuse) through **plasmodesmata** (from companion cell to sieve element) ; **7** into **sieve, tube / element** ;	**max 3**	**1** **ACCEPT** description of active transport **DO NOT CREDIT** hydrogen, H, H_2, hydrogen molecules **2** **ACCEPT** description of gradient created **5** **IGNORE** carrier protein **For mark points 4 and 6** **IGNORE** sugar If wrong assimilate is named e.g. glucose penalise once and then apply ECF
			QWC ;	**1**	Any **three** with correct spelling and a suitable context from: **companion, diffuse / diffusion,** **gradient, concentration,** **facilitated, cotransport,** **plasmodesmata, sieve tube,** **sieve element, hydrogen ions / protons**
			Total	**[10]**	

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