OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced Subsidiary GCE

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

Mark Scheme for June 2012

Oxford Cambridge and RSA Examinations

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotations available in SCORIS.

Annotation	Meaning
	Benefit of Doubt
	Contradiction
	Cross
	Error Carried Forward
	Odd or incorrect Grammar
	Extendable horizontal wavy line
	Ignore
	Large dot (Key point attempted)
	Benefit of the doubt not given
	additional QWC credit given
	Tick
	Tick 1
	Tick 2
	Omission Mark

Question			Answer	Marks	Guidance
1	(a)	(i)	mitosis ;	1	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**
		(ii)	*idea that:* cells, genetically identical / have same DNA ; so both (daughter) cells receive a full, copy / complement ;	2	**ACCEPT** in context of identical to each other or identical to parent **ACCEPT** 'same genetic information/material' **ACCEPT** same / correct amount of DNA **ACCEPT** same / correct number of chromosomes **IGNORE** ref to clones unqualified **IGNORE** 'new cells need genetic material' without ref to full amount daughter cells have all the identical genetic material = 2 marks (mp 1 and 2)
	(b)		**1** one maternal and one paternal / AW ; **2** carry same genes ; **3** carry, same / different, alleles ; **4** (usually) same / similar, length ; **5** centromere in same position ; **6** same banding pattern ; **7** pair up in meiosis / form bivalent ;	3 max	**CREDIT** 'same loci' **IGNORE** 'genetic material', 'genetically identical' 'genetic information' **ACCEPT** 'same shape' 'same size' **IGNORE** 'same pattern'
	(c)	(i)	a, group / collection, of cells ; (cells) specialised / AW ; to perform a function(s) / working together ;	2 max	**IGNORE** 'same' or 'different' cells **ACCEPT** same job

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><th>function</th><th>location</th></tr>
<tr><td>acts as a surface

or

short (diffusion) pathway ;</td><td>alveoli

or

cheek lining

or

in blood vessels ;</td></tr>
<tr><td>move, mucus / AW

or

secrete mucus ;</td><td>bronchioles

or

bronchi

or

trachea

or

airways ;</td></tr>
</table>
</td><td>4</td><td>Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
Mark each box independently.

IGNORE description e.g. ‘one cell thick’
ACCEPT glomerulus as blood vessel

ACCEPT move fluid / liquid for mucus
IGNORE removal of germs / dirt / substances / particles

ACCEPT ‘move ovum’ and ‘in fallopian tubes’

ACCEPT removal of bacteria / fungal spores / dust if in mucus</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>12</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
2	(a)	(i)	**C** (secretory / Golgi) vesicle **;** **D** plasma membrane **or** cell <u>surface</u> membrane **;** **E** ribosome **;**	3	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **DO NOT CREDIT** lysosome **ACCEPT** cell plasma membrane **IGNORE** rough endoplasmic reticulum
		(ii)	enzyme / (peptide) hormone / glycoprotein **;**	1	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** named example e.g. insulin, mucus, cytokine, antibodies, collagen **IGNORE** haemoglobin, histamine, steroid hormones e.g. testosterone
		(iii)	transport vesicles to, plasma / cell surface, membrane **;** fusing vesicle to membrane / <u>exo</u>cytosis **;**	1 max	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **CREDIT** greater detail of cytoskeleton activity e.g. role of protein motors / changing length of microtubules - 'transport' alone not enough **IGNORE** ref to membrane unqualified **ACCEPT** binding / merging **IGNORE** bonding
		(iv)	**1** receives proteins from the, (R)ER / ribosomes **;** **2** modify / process, proteins **or** make glycoproteins / add named molecule(s) / described **;** **3** (re)package / AW**,** into vesicles **;** **4** make lysosomes **;** **5** replenishes, plasma / cell surface, membrane **;** **6** lipid synthesis **;**	2 max	**IGNORE** SER eg add carbohydrate groups / sugars or fold protein modifies and packages proteins into vesicles = 2 marks **ACCEPT** make glycolipids

Question			Answer	Marks	Guidance
	(b)	(i)	nucleus **or** nuclear, envelope / pore / membrane **;** mitochondrion / mitochondria **;** (rough / smooth) endoplasmic reticulum / ER OR ribosomes attached to membrane **;** Golgi (body / apparatus) **;** (secretory) vesicle(s) **;**	2 max	**Mark the first two answers only.** **IGNORE** membrane bound organelles, lysosomes, free ribosomes, ref to ribosome size
		(ii)	(free / circular / naked) DNA / genetic material / nucleoid **;** <u>plasmid</u> **;** 18nm / 70S / smaller, ribosomes **;**		**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **IGNORE** 'chromosomes', 'chromatin' **IGNORE** mesosome (as this is an infolding of plasma membrane and not <u>in</u> the cytoplasm)
			Total	**10**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>
<table>
<tr><td></td><td>open circulatory system</td><td>closed circulatory system</td></tr>
<tr><td>single circulatory system</td><td></td><td></td></tr>
<tr><td>double circulatory system</td><td></td><td>✓ ;</td></tr>
</table>
</td><td>1</td><td>ACCEPT cross / other mark
DO NOT CREDIT if a tick is placed in more than one box</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>systole / contraction, increases pressure ;

diastole / relaxation/ blood flowing onwards, decreases pressure ;

(contraction of) ventricle, muscle / wall ;

left (ventricle) ;</td><td>2 max</td><td>IGNORE ‘the heart’ or ‘the heart beating’ or ‘the heart pumping’ without further qualification
IGNORE ref to right (side) for mp 1 - 3

ACCEPT ref to peak on graph for increasing pressure

ACCEPT ref to trough on graph for decrease in pressure

ACCEPT ventricular systole

‘contraction of left ventricle’ = 1 mark
‘contraction of muscle in left ventricle’ = 2 marks
‘ventricular systole increases pressure’ = 2 marks</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>pulse / heart, <u>rate</u> ;</td><td>1</td><td>IGNORE heart beat / beats per minute</td></tr>
</table>

Question	Answer	Marks	Guidance
(c)	*marks for pressure change:* pressure drops, as distance from heart increases **;** greatest / rapid / significant, pressure drop while blood is in the arteries **;** pressure, constant / does not drop, in veins **;** *marks for amplitude of fluctuations:* fluctuation / AW, decreases from aorta to arteries **;** no fluctuation in, capillaries / veins **;** use of comparative figures with unit **;**	3 max	**ACCEPT** from aorta to arteries / correctly named blood vessels – look for decrease in pressure trend **ACCEPT** plateaus / level **IGNORE** ref to frequency of fluctuations **ACCEPT** 'smaller fluctuations in artery' correct figures must be quoted from the graph to back up <u>one</u> point – correct unit used at least once. eg 'peak to peak', between aorta and arteries, falls 18.5 to 14 kPa pressure in aorta between 18.5 and 12.5 kPa pressure in arteries drops from 12.5 to 5 kPa pressure in capillary drops from 5 to 0.5 kPa overall drop from 18.5 to 0.5 kPa *Any other figures must be checked against graph* **ACCEPT** correct calculated figure eg pressure drops 6kPa in aorta

Question			Answer	Marks	Guidance
	(d)	(i)	blood flows into larger number of vessels ; (total) cross-sectional area of the arteries is greater than the aorta ; (total) cross-sectional area of the capillaries is greater than the, aorta / arteries ;		**IGNORE** ref to pressure fluctuations and structure of vessel walls as not relevant to overall pressure change **ACCEPT** idea of vessels branching to many/more (smaller) vessels **IGNORE** ref to lumen size
			capillary (wall) is, thin / only one cell thick ; (high pressure would) burst / damage, capillary (wall) ; reduce chance of, tissue fluid build up / oedema ;	2 max	**IGNORE** ref to rate of flow **IGNORE** ref to capillary walls small / made of squamous cells **ACCEPT** cannot withstand (high) pressure
			Total	**11**	

Question			Answer	Marks	Guidance
4	(a)	(i)			**CREDIT** mps 1-3 in context of either blood cell or plant cell Comparative statement must be made.
			1 cell (cytoplasm) has a lower **water potential** than (distilled) water / ORA **;**		**1 ACCEPT** Ψ **ACCEPT** more negative water potential
			2 water moves (into cells) **,** down water potential **gradient** / from high Ψ to low Ψ **;**		**2 IGNORE** 'along' or 'across' **IGNORE** definition of osmosis in isolation, must be in context of explaining observations
			3 (water) enters the cell by **osmosis ;**		**3 ACCEPT** 'water osmoses into cell' **IGNORE** ref to diffusion
			4 *idea of:* **cell surface / plasma, membrane** (of blood cell) weak so**,** bursts / cannot withstand pressure / **haemolyses ;**		
			5 *idea of:* (plant) cell wall **,** strong / provides support**,** so**,** does not burst / can withstand pressure **;**		**5 IGNORE** ref to rigid wall, wall acts as barrier
			6 (plant) cell becomes **turgid** / **turgidity** increases**,** which reduces water uptake **;** **4 max**		**6 IGNORE** ref to plasmolysis anywhere in response
			QWC – **two** technical terms used in context and spelt correctly **;** **1**		any **two** from: **gradient, water potential**, **osmosis**, **cell surface membrane / plasma membrane,** **turgid / turgidity, (derivatives of) haemolysed** (note: only allow turgid for plant cells)
				5 max	

Question			Answer	Marks	Guidance
		(ii)	use a, salt / sugar, solution **OR** add solute to water **;** use a solution with the, same / similar / lower, water potential as blood cells **;**	1 max	**ACCEPT** saline solution **ACCEPT** isotonic / hypertonic **ACCEPT** same solute concentration / potential **IGNORE** same water concentration **IGNORE** use less water / solution with low water potential
	(b)		diffusion **;**	1	**DO NOT CREDIT** facilitated diffusion
	(c)		**1** active, transport / uptake **;** ***plus any two from:*** **2** cells have, extensions / hairs **;** **3** thin cell wall **;** **4** large / increased, surface area **;** **5** many / more, mitochondria **;** **6** (many) carrier proteins in cell (surface) membrane **;**	3 max	**1 ACCEPT** facilitated diffusion **IGNORE** transport using ATP **DO NOT CREDIT** osmosis **Allow max two marks for specialised features** **2 ACCEPT** cells have root hairs **IGNORE** roots have root hair cells **4 ACCEPT** high, surface area to volume ratio / SA:vol credit in context on root hair cell or root having large surface area **6 ACCEPT** transport proteins / protein pumps **ACCEPT** channel protein in context of facilitated diffusion
			Total	**10**	

Question			Answer	Marks	Guidance
5	(a)	(i)	tidal volume ;	1	
		(ii)	being stretched / stretching ;	1	**ACCEPT** lengthening **DO NOT CREDIT** relaxing **IGNORE** expanding 'stretching and contracting' = **CON**
	(b)		*between **B** & **C** expiration:* **1** (external) **intercostal** muscles / **diaphragm**, relax ; **2** rib cage / ribs**,** move down OR diaphragm, moves / pushed, up ; **3 volume** of, **thorax** / chest cavity / lungs, drops / decreases ; **4 pressure** inside, thorax / chest cavity / lungs, increases ; **5** above, external / atmospheric, pressure ; **6** air leaves down pressure **gradient** ; **7** (elastic) **recoil** of alveoli ; **3 max** QWC – **two** technical terms used in context and spelt correctly ; **1**	4 max	**1 ACCEPT** ref to internal intercostal muscles contracting **1 DO NOT CREDIT** ref to diaphragm relaxing and intercostal muscles (unqualified) contracting **2 IGNORE** 'diaphragm becomes domed / curved' **3 ACCEPT** 'space inside' or 'air in' for volume **5 ACCEPT** (pressure) higher than outside **Answers given in context of 'at B' or 'at C' – QWC not awarded.** Any **two** from **intercostal**, **diaphragm**, **recoil**, **volume** **thorax**, **pressure**, **gradient**
	(c)		12 ;;	2	Allow two marks for correct answer. If answer wrong allow one mark for working $\frac{60}{5}$

Question			Answer	Marks	Guidance
	(d)		*idea that:* thorax / rib cage / lungs, cannot be completely , compressed / flattened **;** trachea / bronchi, held open by cartilage **;** bronchioles / alveoli, held open by elastic fibres **;** AVP **;**	2 max	**IGNORE** bronchioles or alveoli **IGNORE** bronchi or trachea eg absence of pressure gradient / atmospheric and thoracic pressures equal presence of surfactant in alveoli upward movement of diaphragm limited by collagen fibres
			Total	**10**	

Question			Answer	Marks	Guidance
6	(a)	(i)	sucrose **and** phloem ;	1	Both needed for one mark **Mark the first answer on each line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **DO NOT CREDIT** sucrase **DO NOT CREDIT** phloem sieve tubes / companion cells
		(ii)	**1** hydrogen ions / H^+ / protons, pumped out of companion cells ; **2** increases, hydrogen ion / H^+ / proton, concentration (gradient) (outside companion cell) ; **3** hydrogen ions, re-enter / flow back into, companion cells ; **4** sucrose / sugar, moves with hydrogen ions / AW ; **5** down concentration gradient ; **6** ref. cotransporter proteins / cotransport(ation) ; **7** by facilitated diffusion ; **8** sucrose / sugar, diffuses into sieve tube (element) ; **9** through plasmodesmata ;	3 max	**1 ACCEPT** hydrogen ions leave companion cells using ATP **2 ACCEPT** creates gradient **2 DO NOT CREDIT** increase, hydrogen ion / H^+ / proton concentration, in sieve tube element **3 ACCEPT** diffuse / move **4 DO NOT CREDIT** glucose (penalise once) **4 DO NOT CREDIT** sucrose follows H^+ **8 IGNORE** sucrose diffuses into *phloem*

Question			Answer	Marks	Guidance
	(b)		**1** active transport requires ATP **;** *at low temperatures:* **2** (molecules have) little kinetic energy **;** **3** (therefore) less, respiration / ATP made **;** **4** less active transport **or** less, movement / loading, of sugars into sieve tube (element) **;** **5** less, osmosis / movement of water, into sieve tube (element) **;** **6** low (hydrostatic) pressure created **;** *as temperature increases:* **7** (molecules have) more kinetic energy **;** **8** (therefore) more, respiration / ATP made **;** **9** more active transport **or** more, movement / loading, of sugars into sieve tube (element) **;** **10** more , osmosis / movement of water, into sieve tube (element) **;** **11** higher / more (hydrostatic) pressure created **;** **12** at high temperature (plant), enzymes / proteins, denatured **;**	3 max	**1 ACCEPT** loading / uptake for transport **3 IGNORE** no respiration / no ATP made / no loading of sucrose **4 ACCEPT** slow active transport / slow loading **9 ACCEPT** faster active transport / faster loading **12 DO NOT CREDIT** cells denatured **12 CREDIT** change to tertiary structure, damage to proteins
			Total	**7**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

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Facsimile: 01223 552553

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