OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced Subsidiary GCE

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

Mark Scheme for January 2011

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Question			Expected Answers	Marks	Additional Guidance
1	(a)		mitosis / mitotic division **;**	**1**	**DO NOT CREDIT** meitosis, miosis **ACCEPT** mytosis
	(b)		**N ;** **L ;** **K ;** **J ;**	**4**	**Mark the first answer for each stage**. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**.
	(c)		**1** checking, genetic material / DNA / chromatin / chromosome(s) / genes, (for errors) **;** **2** protein synthesis **;** **3** synthesis / replication / increase in number of, organelles / named organelle **;** **4** ATP production / respiration **;** **5** <u>cell</u> growth / increase in <u>cell</u>, volume / size **;**	**2 max**	**Mark the first two suggestions only.** **IGNORE** DNA , replication / synthesis **ACCEPT** checking for mutations **DO NOT CREDIT** check for *cell* mutations **ACCEPT** named step e.g. transcription / translation / described **CREDIT** one named organelle only **ACCEPT** centriole as organelle **IGNORE** organelle growth **IGNORE** release energy **DO NOT CREDIT** produce / create, energy (in form of ATP) **IGNORE** cytoplasm replicates

Question	Expected Answers	Marks	Additional Guidance
(d)			**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.**
	in plant (cell), plate / wall, forms (between new cells) **;** *idea of :* cytokinesis starts from middle of cell **;** (only) occurs in meristem **;** no centrioles **;** AVP **;**	**2 max**	Assume response refers to plants unless stated otherwise. Accept reverse argument for animals. **CREDIT** in animal no cell plate **IGNORE** plants have cell walls unqualified **ACCEPT** cytokinesis starts at outer edge in animals **ACCEPT** cambium / specialised tissues / cells **IGNORE** ref (root) cap, root tip / shoot tip **CREDIT** in animals most, cells / tissues, can divide **ACCEPT** centrioles not used to pull chromatids apart **DO NOT CREDIT** no spindle fibres in plants e.g. nuclear envelope does not reform in most plant cells in telophase I (it does form in most animal cells)
	Total	**9**	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		A = bronchiole **;** B = alveolus / alveoli **;**	**2**	**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**. **DO NOT CREDIT** bronchus **ACCEPT** phonetic spelling of alveolus and bronchiole e.g. aveoli
	(b)		**1** large, surface area / SA :VOL **;** **2** (alveolar) wall / epithelium, one cell thick **;** **3** (made of) squamous, cells / epithelium **;** **4** ref to surfactant **;** *idea of:* **5** (very) close to, capillaries / blood supply **OR** rich blood supply / many capillaries **;**	**2 max**	**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **ACCEPT** large SA / VOL, (alveoli) are small **and** in large number **DO NOT CREDIT** large amounts of tiny alveoli **ACCEPT** thin wall / thin barrier **DO NOT CREDIT** ref to cell wall / lining **IGNORE** alveolus one cell thick **ACCEPT** correct description of squamous cells (e.g. thin flat cell layer) **ACCEPT** pavement epithelium **IGNORE** reference to moist **DO NOT CREDIT** endothelium **IGNORE** ref to elastic fibres

Question	Expected Answers	Marks	Additional Guidance
(c)	**1** (histamine), binds / attaches, to, receptor / glycoprotein **;** *idea of :* **2** in / on, plasma / cell surface, membrane (of muscle cell) **;** **3** <u>complementary</u> (shape) **;** **4** triggers response / causes effect, inside cells **;**	**2 max**	**binds to complementary receptor = 2 marks** **ACCEPT** glycolipids **IGNORE** binding site, ref antigens **ACCEPT** in / on, cell surface / cell membrane (of muscle cells) **ACCEPT** membrane bound receptors (on muscle cells) **CREDIT** correct examples of effects / details inside cells e.g. ref to opening sodium channes in cell surface membrane ref to second messenger ref to cyclic AMP ref to activation of enzymes / kinases ref to phosphorylation
(d)	*idea of :* **1** more tissue fluid formed / increase in volume of tissue fluid **;** **2** increase pressure in tissue **;** **3** swelling / inflammation / oedema**;** **4** (more) white blood cells pass into tissues **;** **5** larger molecules / (named) proteins , pass into tissue fluid **;**	**2 max**	**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **IGNORE** refs to the capillaries becoming more leaky **IGNORE** more water passes out **DO NOT CREDIT** *cells* swell **ACCEPT** (more) white blood cells leave the capillary **IGNORE** ref to more, glucose / nutrients / gases, leave blood capillary **IGNORE** ref to increased rate of diffusion
	Total	**8**	

Question			Expected Answers	Marks	Additional Guidance
3			surface area to volume ratio ;		**ACCEPT** SA / VOL **or** SA:Vol
			<u>erythrocytes</u> ;		**ACCEPT** minor spelling errors if phonetically correct e.g. erythocyte **DO NOT CREDIT** erthocytes, erephosite, erthrocyte **IGNORE** red blood cells
			affinity ;		**ACCEPT** attraction
			oxyhaemoglobin ;		**ACCEPT** HbO / HbO_8 **DO NOT CREDIT** HbO_2 etc
			carbon dioxide / CO_2 / hydrogen ions / H^+ ;		**ACCEPT** carbonic acid **DO NOT CREDIT** CO^2 **DO NOT CREDIT** hydrogen, H, H_2
			Bohr / bohr (shift) ;	6	**ACCEPT** phonetic spellings e.g. borr, bore, borh
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		U ; R ; V ;	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**.
	(b)		no cross walls / cells joined end to end / continuous ; hollow / no contents / no organelles / no cytoplasm ; (walls / vessels) lignified ; (bordered) pits in walls ;	2 max	**IGNORE** ref to dead cells / tubes **DO NOT CREDIT** lined / covered with lignin **DO NOT CREDIT** (walls) made of lignin **ACCEPT** xylem has lignin
	(c)	(i)	evaporation / loss of water vapour ; from, aerial parts of plant / leaf / leaves ; via stomata ;	2 max	**movement of water vapour out of leaf = 2 marks** **DO NOT CREDIT** loss of water alone **CREDIT** loss through cuticle / epidermis

Question	Expected Answers	Marks	Additional Guidance
(c) (ii)	*In the leaf:* *idea of :* **1** water loss (from leaf) is replaced **;**		**DO NOT CREDIT** ref to water potential in context of xylem **IGNORE** ref to root pressure or capillarity **ACCEPT** Ψ / WP for water potential
	2 via, **apoplast** / **symplast** / **vacuolar**, pathways **;**		For mp 2 & 3 **DO NOT CREDIT** in context of root **CREDIT** pathways described in correct context
	3 down **water potential** gradient / AW **;**		Idea of :
	4 (lost water replaced) by water from the **xylem ;**		water leaving xylem to enter leaf cells (that have lost water)
	In the xylem: **5** (loss of water) causes, low / negative, (**hydrostatic**) pressure (at top / in leaf) **OR** creates pressure gradient **;**		
	idea of : **6** water moves, from higher pressure to lower pressure / down pressure **gradient ;**		**IGNORE** 'water moves by the cohesion-tension theory' without further explanation **ACCEPT** along pressure gradient
	7 under **tension** / pulled up / drawn up **;**		Idea of: pulling force and not just water movement created by transpiration **DO NOT CREDIT** mp 7 or 8 in context of adhesion / capillarity or water potentials
	8 by **<u>mass flow</u> ;**		**IGNORE** suction, transpiration pull unqualified
	9 cohesion / attraction, between water molecules **;**		**CREDIT** hydrogen bonding between water molecules
	idea of : **10** column / stream / chain, of water (molecules) **;**	**4 max**	**IGNORE** long unqualified
	QWC ;	**1**	<u>TWO</u> terms used appropriately and spelt correctly: **xylem , apoplast/symplast/vacuolar , hydrostatic , gradient , cohesion / cohesive , tension , mass flow , water potential**

Question			Expected Answers	Marks	Additional Guidance
		(iii)	*Ref to :* bubbles / air (present / being removed) **;** (blockage) in xylem **;** restore (continuous) column of water (in xylem) **;**	**2 max**	**air in the xylem = 2 marks**
			Total	**14**	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	nucleus / nuclear envelope / nuclear membrane / nucleolus **;** membrane bound organelles / named organelle **;** ribosomes larger **;** (large) cell size / 20µm wide **;**	**2 max**	**Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **ACCEPT** SER / RER / vesicle / cilia **DO NOT CREDIT** presence of ribosome / vacuole / flagellum / undulipodium
		(ii)	*Two marks for correct answer* 4500 **; ;**	**2**	**No tolerance in initial measurement = exactly 90mm** If answer is incorrect, allow one mark for correct working i.e. any measurement divided by 20 e.g. 8.9 / 20
		(iii)	**1** provides, strength / stability / support (cell) **;** **2** determines shape / changes shape / moves membrane (for endo / exocytosis) **;** **3** movement of, organelles / named organelle / RNA / protein / chromosomes / chromatids **;** **4** attachment to / hold, organelles / named organelle, in place**;** **5** make up, centrioles / spindle fibres **;**	**2 max**	**Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **IGNORE** structure **IGNORE** movement of (whole) cell e.g. vesicles, cilia, mitochondria, ribosome

Question			Expected Answers	Marks	Additional Guidance
	(b)	(i)	differentiation **;**	**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**. **DO NOT CREDIT** specialisation
		(ii)	**1** (many) **lysosomes** / vesicles containing enzymes **;** **2** (many) microfilaments / microtubules **OR** ref to, extensive / well developed, cytoskeleton **;** **3** (many) **ribosome**s / (a lot of) **rough endoplasmic reticulum** / (a lot of) RER **;** **4** (many) **mitochondria ;** **5** (lots of) **Golgi ;** **6** (many) receptor (sites) on, **cell surface / plasma , membrane ;** **QWC ;**	**3 max** **1**	**Max 2 marks for content if no reference is made at least once to large numbers of named organelles / receptors** **IGNORE** reasons or explanations **IGNORE** lobed nucleus **IGNORE** many enzymes **IGNORE** lysomes **ACCEPT** lyosomes **DO NOT CREDIT** lysosomes are enzymes **IGNORE** ref glycoproteins / glycolipids unqualified TWO terms used appropriately and spelt correctly: **lysosome(s), ribosome(s), rough endoplasmic reticulum, mitochondria / mitochondrion, Golgi/golgi, microfilaments/microtubules / cytoskeleton, cell surface membrane / plasma membrane.**
			Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	osmosis **;**	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**. **DO NOT CREDIT** diffusion
		(ii)	fit between (phospho)lipids / through (phospho)lipid (bi)layer **;** via, protein <u>channels</u> / protein <u>pores</u> / aquaporins **;**	2	**DO NOT CREDIT** fit through phospholipids (molecules) **DO NOT CREDIT** carrier proteins – if this is used do not award mp 2 **IGNORE** transport proteins
	(b)		cell wall **;** provides strength / withstands (internal) pressure / prevents cell membrane over expanding / exerts pressure potential **;** limits uptake of water **;**	2 max	**'has a strong cell wall' = 2 marks** **IGNORE** rigidity (of wall), cytoplasm pushes against cell wall **ACCEPT** stops uptake of water (when turgid)
	(c)	(i)	between –1451 and –1799 **;**	1	**Ensure figure is a negative number** **CREDIT** a range or single value within this range

Question			Expected Answers	Marks	Additional Guidance
		(ii)	*idea of:* **1** plot, percentage plasmolysed against water potential (of solution) / water potential on X axis and % plasmolysed on Y axis **;** *idea of:* **2** read down from 50% plasmolysed to water potential **;** **OR** *idea of:* **1** plot, % plasmolysed against sucrose concentration / sucrose concentration on X axis and % plasmolysed on Y axis **;** *idea of :* **2** read down from 50% plasmolysed to sucrose concentration **AND** look up equivalent water potential **;**	**2**	**IGNORE** ref to bars / bar graph **ACCEPT** axes wrong way round **ACCEPT** marking points shown correctly on annotated sketch line graph

Question	Expected Answers	Marks	Additional Guidance
(d)	*reliable* **R1** observe more pieces of onion (epidermis from each solution) **;** **R2** count more cells (in each piece of epidermis) **;** **R3** calculate a mean **;** **R4** identify / ignore anomalous results **;** **max 3** *accurate* *idea of:* **A1** use, more / intermediate, concentrations within existing range / smaller gap between concentrations / closer (concentration) values **;** **A2** narrower range around 50% plasmolysis / 0.4 - 0.7 mol dm^{-3} / -1120 to -2180 kPa **;** **A3** take photographs and mark cells as counting **;**	**4 max**	**DO NOT CREDIT** 'repeats' unless qualified **ALLOW** 'repeat the results / experiment' to indicate more pieces of epidermis **IGNORE** average **ACCEPT** outliers for anomalies **IGNORE** removes / avoids, anomalies **IGNORE** lack of units **ACCEPT** examples of values quoted in between original values e.g. 0.25, 0.35, etc. **ACCEPT** 0.2 **and** 0.9 **ACCEPT** examples of values if clearly showing application of correct narrower range e.g. 0.45, 0.55 , 0.65 For A2 **DO NOT CREDIT** quoted values extend beyond correct narrower range e.g. 0.35, 0.55, 0.75
	Total	**12**	

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

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553