OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced Subsidiary GCE

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

Mark Scheme for January 2013

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

Annotation	Meaning
	Benefit of Doubt
	Contradiction
	Cross
	Error carried forward
	Given Mark
	Extendable horizontal wavy line
	Ignore
	QWC Point
	Benefit of Doubt not given
	additional QWC credit given
	Tick
	Tick 1
	Tick 2
	Omission Mark

Question			Answer	Marks	Guidance
1	(a)		low / small, surface area to volume ratio **;** diffusion, too slow / distance too great **;** to supply enough**,** oxygen / (named) nutrients **;** to prevent, CO_2 / (named) waste product, building up **;** active **;**	3 max	**Mark the first 3 suggestions** **CREDIT** SA/Vol, SA:Vol **ACCEPT** surface area to volume (ie if 'ratio' missed) **IGNORE** lower SA / Vol **ACCEPT** diffusion pathway too long **ACCEPT** diffusion insufficient because, body too large / tissues too deep **ACCEPT** 'transport enough' for 'supply enough' idea of 'enough' is important **ACCEPT** to remove waste products **ACCEPT** to prevent waste reaching toxic levels **ACCEPT** high demand for oxygen / energy **OR** high metabolic rate **OR** endotherm / maintaining temperature / exercising
	(b)	**(i)**	electrocardiogram **;**	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** **IGNORE** ECG **DO NOT CREDIT** electrocardiograph
		(ii)	**A** sinoatrial node / SAN **;** **B** atrioventricular node / AVN **;**	2	**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** sinalatrial node / sanatrial node = NBOD atroventricular / atrialventricular, node= BOD artrialventricular / avioventricular node = NBOD

Question			Answer	Marks	Guidance
	(c)	(i)	(to allow time) for the atria to (fully) contract ; to allow (time for), atria to empty / blood to move / ventricles to fill ; so that ventricle(s) do not contract, too early ;	2 max	**ACCEPT** systole for contraction **IGNORE** pumping **ACCEPT** so atria and ventricles do not contract at the same time **ACCEPT** (atria contract) before ventricular systole occurs **Note:** so ventricles do not contract before they are full = 2 so ventricles do not contract before atria are empty = 2 so atria have time to empty before the ventricles start to contract = 2
		(ii)	so that (ventricular) contraction starts at, apex / base / bottom ; to push blood upwards OR into/ towards, (named) arteries ; complete / efficient, emptying of ventricles ;	2 max	**IGNORE** ref to gravity / ref to blood pressure **ACCEPT** systole for contraction **ACCEPT** contract from the apex **IGNORE** pumping **ACCEPT** force all blood out of heart
			Total	**10**	

Question			Answer	Marks	Guidance
2	(a)	(i)	budding ;	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** **IGNORE** mitosis / asexual
		(ii)	mitosis ; swelling / bulge, in (surface of) the cell ; nucleus moves into, swelling / bulge / bud ; idea that, bulge / bud, nips / pinches / breaks off / cleaves ; ref to uneven distribution of cytoplasm ;	2 max	Ensure this is in context of before nucleus moves into bud **IGNORE** bud / growth **IGNORE** DNA / genetic material **IGNORE** 'separates' / 'detaches'
	(b)	(i)	35 / 36 ; ;	2	Correct answer = 2 marks If not whole number e.g. 35.79 or 35.8 = 1 mark If answer incorrect allow one mark for seeing: $4 \times 3.14 \times 1.5^2 \div 3.14 \times 0.5^2$ **OR** $4 \times 1.5^2 \div 0.5^2$ **OR** $4 \times 2.25 \div 0.25$ **OR** $\frac{4 \times 3.14 \times 2.25}{3.14 \times 0.25}$

Question			Answer	Marks	Guidance
		(ii)	new bud cannot occur, on / close to, old scar **;** not enough space between scars for another bud **;** yeast cell not a true sphere **;** (gene) mutation / DNA damage **;**	1 max	**CREDIT** idea that some of surface between scars is not used / ref to unable to tessellate / scars not closely packed **IGNORE** 'covered in scars' OR ref to scar size **IGNORE** ref to chromosome numbers
	(c)		(cells) **differentiate(d)** / **specialise(d)** **;** (groups of) cells form **tissue**(s) **;** (groups of) tissues form **organ**(s) **;** (groups of organs) form **organ system**(s) **;** (group of) cells / tissues / organs / organ systems, work together / interact **;** named example of a tissue / an organ /an organ system **;** QWC **;**	4 max 1	**IGNORE** 'system' alone **ACCEPT** same job / same task / same function It should be clear whether they are naming a tissue, an organ or a system **NOTE e.g.** cells work together to form tissues = 2 marks (mp2 and 5) **two** terms used appropriately and spelled correctly **ACCEPT** correct derivations of these terms: **differentiate**, **specialise / specialize**, **tissue**, **organ**, **organ system**
			Total	**11**	

Question			Answer	Marks	Guidance
3	(a)		partially permeable **;**	1	**ACCEPT** selectively permeable / differentially permeable **DO NOT CREDIT** semi permeable **IGNORE** fluid mosaic
	(b)		fluid mosaic **;** active **;** fats / lipids / oils / cholesterol / oxygen / carbon dioxide / (named) steroid hormones / fat soluble vitamins **;** carrier / (co)transport(er) **;**	4	**ACCEPT** phonetic spelling **IGNORE** 'mosaic structure' **ACCEPT** O_2 and CO_2 **ACCEPT** Vitamin A / D / E / K **DO NOT CREDIT** water **DO NOT CREDIT** channel
	(c)	(i)	communication between cells **;** *idea that:* molecule released by one cell, attaches to / causes change in, another cell **;**	1 max	**ACCEPT** cell communication **IGNORE** ref to cell recognition and cell binding

Question			Answer	Marks	Guidance
		(ii)		3 max	**ACCEPT** hormone / messenger (molecule) / named hormone for signal throughout **IGNORE** 'molecule' / 'proteins' alone unless qualified
			release of signal molecule by, **exocytosis** / **secretion** **OR** described **;**		
			idea that: proteins / **glycoprotein**s / **glycolipid**s, act as / have, **receptor**s **OR** described **;**		**ACCEPT** eg 'place for signal molecules to bind' or 'binding site' for 'receptor'
			idea that: receptor / signal, is **specific ;**		**IGNORE** ref to recognition as meaning specific specific can be described
			idea that: shape of receptor **and** signal are **complementary ;**		this can be described
			idea that: attachment of signal molecule causes change (inside cell / on cell surface) **;**		e.g. cause release of cAMP e.g. hormones trigger a reaction in the cell
			cell surface membrane allows entry of some signal molecules **;**		**ACCEPT** diffusion (in context of steroid hormones)
			QWC **;**	1	Award for **two** terms used appropriately and spelled correctly **exocytosis**, **secretion / secretes / secreted**, **glycoprotein**, **glycolipid**, **receptor**, **specific**, **complementary**
			Total	**10**	

Question			Answer	Marks	Guidance
4	(a)	(i)	<u>units</u> ; mm s^{-1} ; raw data ; leaf area ;	2 max	 **ACCEPT** mm min^{-1} / cm min^{-1} / cm s^{-1} / written in words **ACCEPT** mm^3 min^{-1} / cm^3 min^{-1} / cm^3 s^{-1} / written in words e.g. individual trial results / the repeat readings / data used to calculate the mean **IGNORE** only the mean is shown **IGNORE** 'how many repeats were done'

Question			Answer	Marks	Guidance
		(ii)		3 max	**ACCEPT** ORA throughout **IGNORE** refs to more bubbles / photosynthesis
			description as number of leaves increases the (rate of) bubble movement increases **;** (pair of) figs to illustrate the change **;**		must be pair of figures illustrating change eg 7 bubble movement with 0 leaves and 92 bubble movement with 8 leaves **ACCEPT** calculated difference e.g. increase of 21 between 2 & 4
			explanation larger (surface) area **;** more stomata **;** more / fast(er), evaporation / transpiration / loss of water vapour **;** more / fast(er), uptake of water (by shoot) **;** *idea that:* (some) bubble movement with no leaves as not all uptake due to transpiration from leaves **;**		**ACCEPT** 'surface area increases' **IGNORE** 'many stomata' OR 'more stomata open' **NOTE** e.g. more, stomata / surface area for transpiration = 2 marks (as more transpiration implied) e.g some loss from other parts of stem / uptake into cells

Question			Answer	Marks	Guidance
	(b)		*statement 1* surface area / SA, of leaves is different **OR** different number of stomata **;** (choose shoot(s) with), similar sized leaves / similar surface area **OR** repeats to calculate mean **;** *statement 2* reduces water (vapour) potential gradient (between inside and outside of leaf) **;** assemble without wetting leaves / dry the leaves / wait until leaves dry **;** *statement 3* (increased temperature) will increase, evaporation / transpiration / loss of water vapour **;** control the temperature / carry out in room with controlled temperature **;**	6	**IGNORE** 'surface area to volume ratio' (as a phrase) **ACCEPT** measure surface area of each leaf **and** calculate rate of movement per unit area **ACCEPT** measure leaves to check they are same size **DO NOT CREDIT** cut or trim leaves to size **ACCEPT** water potential outside leaf is too high **OR** WP outside higher than inside **IGNORE** ref to light **ACCEPT** do it in constant temperature **CREDIT** suitable practical method of achieving this **IGNORE** 'pull blinds down' / 'open the window' / 'general ref to environment or conditions', without mentioning temperature or heat
			Total	**11**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th colspan="3">cell type</th></tr>
<tr><th>feature</th><th>plant cell</th><th>animal cell</th><th>bacterial cell</th></tr>
<tr><td>mitochondria</td><td>✓</td><td>✓</td><td>×</td></tr>
<tr><td>chloroplasts</td><td>✓</td><td>×</td><td>×</td></tr>
<tr><td>cellulose cell wall</td><td>✓</td><td>×</td><td>×</td></tr>
<tr><td>centrioles</td><td>×</td><td>✓</td><td>×</td></tr>
<tr><td>ribosomes</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>
</td><td>4</td><td>Allow one mark for each correct row.
DO NOT CREDIT ‘hybrid’ ticks or crosses

NB each row must have 3 correctly completed boxes</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>1 ;
4 ;
2 ;
2 ;</td><td>4</td><td>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</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>ribosome(s) ;</td><td>1</td><td>IGNORE ‘tube number’</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
6	(a)	(i)	provides, strength / support **;** to keep, it / the vessel / the tube, open **OR** prevent collapse of, vessel / tube **;** (because) transpiration produces, tension / negative pressure **;** to waterproof the, cell / vessel / tube / wall **;** (so) cell**,** dies / content decays **;** to create a hollow, tube / vessel **OR** to create a continuous column / allow unimpeded flow **;** to limit lateral flow of water **;** ref to adhesion (between water molecules and wall) **;**	3 max	**IGNORE** ref to flexibility **IGNORE** xylem unqualified **IGNORE** 'collapse of wall' **IGNORE** 'xylem' **IGNORE** xylem vessels die **CREDIT** reduce / prevent lateral movement **ACCEPT** lignin helps water move by adhesion
		(ii)	(provides) strength / support, to keep, it / trachea / airway, open **OR** (provides) strength / support, to prevent collapse **;** during, inspiration / inhaling / breathing in **;** volume of, chest cavity / thorax / lungs, increases **;** low(er) / negative, pressure in, trachea / thorax / lungs **;**	3 max	**IGNORE** ref to alveoli / C-shape of cartilage **ACCEPT** in context of bending the neck

Question			Answer	Marks	Guidance
	(b)			3 max	ensure that 'surface area to volume ratio' is used correctly
			body has small <u>surface area to volume ratio</u> **OR** lungs, provide / have, large <u>surface area to volume ratio</u> **;**		**CREDIT** SA/Vol, SA:Vol **ACCEPT** person for body
			correct calculation of (one) surface area to volume ratio **;**		25.7 /26 (:1) for body OR 1000(:1) for lungs DO NOT CREDIT 1 : 1000 OR 1 : 26
			idea of: body SA / SA:Vol is not big enough to meet body's needs **OR** lung SA / SA:Vol is big enough to meet body's needs **;**		**e.g.** allows gaseous exchange at a high enough rate **IGNORE** ref to efficiency
			oxygen into (blood / body) **and** carbon dioxide out (of blood / body) **;**		**CREDIT** O_2 and CO_2
			Total	**9**	

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