

Applied Science Double Award

General Certificate of Secondary Education **J649**

Mark Schemes for the Units

January 2009

J649/MS/R/09J

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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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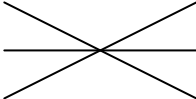
MARK SCHEMES FOR THE UNITS

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B482/01 Foundation Tier

Question				Expected answers	Mks	Additional guidance
1	(a)			stronger / holds more weight; less risk of bridge breaking / causing accident idea	2	ALLOW 'more support'
	(b)			SRC: composite; cement: ceramic; steel: metal;	3	
	(c)	(i)		concrete goes <u>rusty</u> when it is old / <u>rust</u> makes orange stains	1	
		(ii)		weaker / breaks / cracks	1	IGNORE bridges collapse
		(iii)		steel conducts electricity / high conductivity / rust lowers conductivity	1	
					8	

Question				Expected answers	Mks	Additional guidance
2	(a)	(i)		nitrogen; phosphorus;	2	
		(ii)		through the root hairs	1	Box 2
	(b)	(i)		grows faster / more / bigger	1	
		(ii)		harms wildlife; nitrates in drinking water; eutrophication; gets in river;	2	
	(c)			use organic fertiliser / named example / manure / compost	1	
	(d)	(i)		yeast; nutrients; water; sugar;	2	
		(ii)		(higher) temperature / heat it up / <u>more</u> sugar / <u>more</u> blackberries;	1	add <u>different</u> type of yeast
						10

Question				Expected answers	Mks	Additional guidance
3	(a)			sulfur <u>and</u> oxygen / air	1	need both
	(b)			large scale idea / made in large amounts	1	
	(c)			H ₂ SO ₄	1	
	(d)			oxidation	1	
	(e)	(i)		the products form faster; less energy is needed for the reaction;	2	
		(ii)		<u>higher</u> temperature / heat it up; higher pressure; higher concentration; grind up solid / bigger surface area; stir it / shake it;	any 2	
	(c)				2	all 3 correct = 2 1 or 2 correct = 1
					10	

Question			Expected answers	Mks	Additional guidance
4	(a)	(i)	radioactive element	1	Box 1;
		(ii)	nuclear fuels emit ionising radiation; ionising radiation can harm living things;	1 1	Box 2; Box 4;
	(b)	i	heat; light; sound; movement (kinetic); chemical; potential energy;	any 2	
		(ii)	idea of easy to transmit; idea of used by lots of devices; no storage needed / 'always on' idea; no pollution <u>in the house</u> ; different sources can produce electricity;	any 2	
		(iii)	by the National Grid	1	
	(c)	(i)	coal; (crude) oil; (natural) gas;	any 2	
		(ii)	biofuel; solar (cells); wave power; wind (farms);	any 2	
				12	

Question			Expected answers	Mks	Additional guidance
5	(a)	(i)	sugar / glucose	1	
		(ii)	high blood sugar levels / low blood sugar levels / correct blood sugar levels	1	idea of <u>amount</u> NOT levels or <u>level</u> needed of insulin
		(iii)	idea of automatic / no injections; anywhere idea; dose is measured / no errors in measurement; continuous monitoring / immediate treatment;	any 2	IGNORE "quicker" alone
	(b)	(i)	pancreas	1	
		(ii)	plasma	1	
		(iii)	insulin is carried in the blood; blood travels more slowly than nerve impulses	2	Box 2 Box 4
	(c)		exercise; less sugar; (change your) diet / control sugar intake;	2	eat less sugar = 2 marks ACCEPT tablets
				11	

Question				Expected answers	Mks	Additional guidance
6	(a)			tectonic	1	
	(b)	(i)		on any plate boundary	1	
		(ii)		named method e.g. GPS / lasers / photographs; idea of more than one measurement. (over time); measure speed;	any 2	ACCEPT two named methods for both marks ALLOW satellite
	(c)	(i)		A	1	
		(ii)		B	1	
	(d)	(i)		mountain formation; volcanoes;	1 1	Box1; Box 3;
		(ii)		continental drift; continents are on / part of plates; <u>plates</u> are moving apart / in opposite direction / arrows on diagram in opposite direction; new plate forming (at mid ocean ridge); convection current / moving mantle	any 2	ACCEPT moving molten rock/magma
					10	

B482/02 Higher Tier

Question			Expected answers	Mks	Additional guidance
1	(a)		tectonic	1	
	(b)	(i)	on any plate boundary	1	
		(ii)	named method e.g. GPS / lasers / photographs; idea of more than one measurement. (over time); measure speed;	any 2	ACCEPT two named methods for both marks ALLOW satellite
	(c)	(i)	A	1	
		(ii)	B	1	
	(d)	(i)	mountain formation; volcanoes;	1 1	Box1; Box 3;
		(ii)	continental drift; continents are on / part of plates; <u>plates</u> are moving apart / in opposite direction / arrows on diagram in opposite direction; new plate forming (at mid ocean ridge); convection current / moving mantle	any 2	ACCEPT moving molten rock/magma
				10	

Question			Expected answers	Mks	Additional guidance
2	(a)	(i)	sugar / glucose	1	
		(ii)	high blood sugar levels / low blood sugar levels / correct blood sugar levels	1	idea of <u>amount</u> NOT levels or <u>level</u> needed of insulin
		(iii)	idea of automatic / no injections; anywhere idea; dose is measured / no errors in measurement; continuous monitoring / immediate treatment;	any 2	IGNORE "quicker" alone
	(b)	(i)	pancreas	1	
		(ii)	plasma	1	
		(iii)	insulin is carried in the blood; blood travels more slowly than nerve impulses	2	Box 2 Box 4
	(c)		exercise; less sugar; (change your) diet / control sugar intake;	2	eat less sugar = 2 ACCEPT tablets
				11	

Question				Expected answers	Mks	Additional guidance
3	(a)			hard / strong; will not melt / high melting point; good insulator / poor conductor; unreactive / wont burn;	any 2	
	(b)			shared; electrons pairs (of electrons)	any 2	
	(c)	(i)		polymer chains /strands/ fibres or molecules	1	not just polymer
		(ii)		thermosetting: cross-links; sticking together / cant move about; OR thermoplastic: no cross links; slide about; linked to temperature;	any 2	
	(d)			sea of / surrounded by electrons; fixed ions / atoms; current is flow of charge; electrons can move easily; high current; many electrons;	any 2	
					9	

Question			Expected answers	Mks	Additional guidance
4	(a)	(i)	no CO ₂ / less transport / not using up fossil fuels / less space / land used / small amounts of fuel	1	ACCEPT <u>less</u> named pollutant
		(ii)	radiation hazard; waste disposal problems; security issues	1 1	ALLOW non-renewable / finite
	(b)		cannot be replaced / once used up are gone	1	IGNORE idea of re-used / re-made
	(c)		many power stations (explicitly stated); idea of network; power can switched from one area to another / power stations not all working at same time idea; transformers (step voltages up and down); physical description e.g. pylons and overhead cables / power lines;	any 2	
	(d)	(i)	power = voltage x current	1	ACCEPT symbols
		(ii)	current = power ÷ voltage OR 200,000,000 ÷ 400,000; 500	1 1	correct numerical answer gains 2 marks
	(e)	(i)	labelled output arrows as: electrical; heat / wasted / lost; heat arrow at least 2 x electricity arrow e.g.	1 1 1	
			(ii)	40(%) OR 0.4	1
				13	



Question				Expected answers	Mks	Additional guidance	
5	(a)			used for making proteins making chlorophyll growing roots	mineral nitrate magnesium phosphate	1 1 1	
		(b)	(i)	mitosis		1	
			(ii)	2		1	
	(c)			CO ₂ and H ₂ O; oxygen and O ₂ ; correctly balanced: 6CO ₂ + 6H ₂ O → C ₆ H ₁₂ O ₆ + 6O ₂ ;		1 1 1	
	(d)			starch insoluble / glucose soluble		1	
					9		

Question				Expected answers	Mks	Additional guidance
6	(a)	(i)		sulfur and oxygen	1	both needed
			(ii)	sulfur dioxide / sulfur trioxide / sulfuric acid	1	any 2 for 1 mark
			(iii)	air	1	
	(b)	(i)		2; O ₂ ;	2	
			(ii)	oxidation / redox	1	ACCEPT exothermic
			(iii)	rate / speed increases; because particles are closer together; increase <u>rate</u> or <u>frequency</u> of collisions / more likely to collide; more successful / effective collisions;	any 2	IGNORE 'more collisions' alone
(c)			dyes	1		
					9	

Grade Thresholds

General Certificate of Secondary Education
Applied Science (Double Award) J649

January 2009 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B481	Raw	50	46	42	38	35	28	22	16	10	0
	UMS	100	90	80	70	60	50	40	30	20	0
B482/1	Raw	60				34	28	22	17	12	0
	UMS	100				60	50	40	30	20	0
B482/2	Raw	60	45	37	29	21	14	10			0
	UMS	100	90	80	70	60	50	45			0
B483	Raw	50	46	42	38	35	28	22	16	10	0
	UMS	100	90	80	70	60	50	40	30	20	0

Entry Information

Unit	Total Entry
B481	3596
B482/1	6007
B482/2	1136
B483	345

Specification Aggregation Results

	A*A*	A*A	AA	AB	BB	BC	CC	CD	DD	DE	EE	EF	FF	FG	GG
UMS	270	255	240	225	210	195	180	165	150	135	120	105	90	75	60
Cum %	0.0	0.0	0.0	0.0	0.0	5.6	38.9	88.9	88.9	94.4	94.4	94.4	94.4	100.0	100.0

179 candidates were entered for aggregation this series.

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication.

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