

# **Applied Science Double Award**

General Certificate of Secondary Education **J649**

## **Mark Schemes for the Units**

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**January 2010**

**J649/MS/R/10J**

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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		to save money / stop wasting money / reduce cost / it is expensive / environmental consideration of burning fossil fuel e.g. climate change / global warming / reduce carbon dioxide / reduce carbon footprint / saves fossil fuels;	1	<b>Ignore</b> 'harms environment' or 'pollution' alone  <b>Allow</b> any environmental outcome of burning fossil fuels
	b		windows	1	
	c	i	(high) cost; (1)  lowest energy loss / identifies 10% energy loss; (1)  longer payback time =(2)	2	<b>Allow</b> 'heat' for 'energy'
		ii	cavity wall insulation – box 2	1	
	d		shows numbers 10, 15, 25, 35;  15(%)	2	85 shown in working scores first mark  15 scores 2 marks
	e	i	easy to transmit / National Grid / can be used for different devices / heat and light / all over the house idea / clean to use / easy to switch on and off / no storage	1	<b>Ignore</b> 'everything uses...' 'lots of things use...' 'most things use'  <b>Ignore</b> convenient / easy to use / safer / no pollution
		ii	A	1	
		iii	turn off lights / use less lights;	1	<b>Ignore</b> using other types of bulb
<b>Total</b>				<b>10</b>	

Question		Expected answers	Mks	Additional guidance
2	a	<pre> graph TD     SM[steel mesh] --- P[polymer]     SM --- M[metal]     SM --- C[composite]     SRC[steel reinforced concrete] --- M     SRC --- CER[ceramic]     T[tiles] --- C     PC[plastic coating] --- CER           </pre>	3	<p>all correct = 3 2/3 correct = 2 1 correct = 1</p> <p>if a box has more than one line, consider both lines as incorrect.</p>
	b	idea of being stronger / hold it together / gives support / breaks less easily;	1	<p><b>Ignore</b> 'keeps in shape' <b>Ignore</b> 'reinforces' (given in the stem of the question)</p>
	c	i	1	<p><b>Ignore</b> 'they do not rot' (given in question stem).</p> <p><b>Ignore</b> 'pollution' or 'environmental harm' or 'difficult to recycle'.</p>
		ii	2	
		iii	3	<p><b>apply list principle:</b> If <u>more than 2 properties are stated</u>, lose (1) mark for each additional property.</p> <p>e.g. C not flammable not biodegradable (2)</p> <p>C: won't go soft, not flammable, dark coloured = (2)</p> <p>C won't go soft, not flammable, dark coloured, not biodegradable (1)</p>
<b>Total</b>			<b>10</b>	

Question			Expected answers	Mks	Additional guidance
3	a		FTFT	3	all correct = 3 2/3 correct = 2 1 correct = 1
	b		83	1	
	c		30	1	
			20 (times)	1	<b>Do not allow</b> 20 %
	d		true for both; true for an infectious disease; true for both; true for smoking	4	<b>Allow</b> first two or all three boxes ticked on first and third lines (true for both)
<b>Total</b>				<b>10</b>	

Question		Expected answers	Mks	Additional guidance	
4	a		3	all correct = 3 2/3 correct = 2 1 correct = 1  if a box has more than one line, consider both lines as incorrect.	
	b	sulfur			1
	c		3	all correct = 3 2/3 correct = 2 1 correct = 1  if a box has more than one line, consider both lines as incorrect.	
	d	i	bulk	1	
		ii	developing new fertilisers (box 1); controlling the quality of the products (box 3);	2	if more than 2 boxes ticked, apply list principle.
<b>Total</b>			<b>10</b>		

Question			Expected answers	Mks	Additional guidance
5	a	i	stage 1 / water added for germination; stage 3 / water added; stage 5 / yeast added;	any 2	
		ii	stage 5 / yeast added;	1	
	b		<b>reactant:</b> glucose / sugar / maltose;  <b>products:</b> ethanol / alcohol <u>and</u> carbon dioxide / CO <sub>2</sub> ;	1  1	both needed <b>Do not accept</b> CO <sub>2</sub>
	c	i	without oxygen;	1	<b>Ignore</b> 'without air'.
		ii	carbon dioxide / CO <sub>2</sub> ;  water / H <sub>2</sub> O;	2	<b>Ignore</b> energy  <b>Do not allow</b> CO <sub>2</sub> or H <sub>2</sub> O
		iii	needs water;  glucose / sugar / food;  optimum temperature / right or suitable temperature / room temperature / warm;  optimum / right / suitable pH;  no air / no oxygen;	any 2	<b>Allow</b> moist / damp  if temperature given must fall in range 15-40 °C  <b>Ignore</b> 'anaerobic'  if more than two conditions are given, apply list principle for incorrect additional conditions.
	d		any two from:  baking products / specific example;  dairy products e.g. yoghurt / cheese;  medical products / any named medicine;  enzymes;  vinegar;	2	if specific examples are given they must be from different marking points to score (2) e.g. bread and pizza = 1 bread and cheese = 2  <b>Allow</b> marmite (1)
<b>Total</b>				<b>12</b>	



Question		Expected answers	Mks	Additional guidance
6	a	trapped <u>in ice crystals</u> / trapped <u>in freezing water</u> ;  under (high) pressure;	2	<b>Ignore</b> references to mass or density of methane  <b>Ignore</b> 'deep'
	b	change in temperature / warmer / colder;  causes greenhouse effect / is a greenhouse gas;  wetter / more cloud cover / more rain / (rain causes) floods / drier climate;  ice caps melting;  sea levels rise / flooding of coastal areas;  landslides;	any 2	<b>Accept</b> 'global warming' <b>Ignore</b> climate or weather change (these are given in the question stem)  <b>Ignore</b> toxic / harm to living organisms arguments  <b>Ignore</b> pollution
	c	<b>organic</b> : contains carbon;  <b>fossil fuel</b> : from living things / (dead) animals or plants / formed over a long time / millions of years to form;	2	<b>Ignore</b> coal, gas and oil  <b>Allow</b> 'thousands of years' <b>Do not allow</b> 'hundreds'
	d	Plates boundaries move... (box 1);  The rock around a plate.... (box 4);	2	
<b>Total</b>			<b>8</b>	

## B482/02 Higher Tier

Question			Expected answers	Mks	Additional guidance
1	a	i	stage 1; stage 3 stage 5	any 2	
		ii	stage 5	1	
	b		reactant: glucose / sugar / maltose;  products: ethanol / alcohol; carbon dioxide	1  1	both needed
	c	i	oxygen	1	
		ii	carbon dioxide; water;	2	
		iii	needs water; sugar / food; optimum temperature / warm / heat; optimum pH;	2	
	d		any two from: baking products; dairy products e.g. yoghurt; medical products; enzymes;	2	
<b>Total</b>				<b>12</b>	

Question		Expected answers	Mks	Additional guidance
2	a	frozen; trapped in ice crystals; under high pressure	2	
	b	change in temperature / warmer / colder; wetter / more cloud cover floods; ice caps melting; sea levels rise; landslides;	2	<b>Accept</b> 'global warming'
	c	organic: contains carbon / produced by living things;; fossil fuel: from living things	2	living things = 1 only if given in both places
	d	plates move; heat from rocks	2	
<b>Total</b>			<b>8</b>	

Question			Expected answers	Mks	Additional guidance	
3	a		artery: thick muscular / elastic walls; vein; carries low pressure blood to heart; capillary function; allows materials in and out of blood; capillary adaptation: single cell thick / very thin wall;	4		
		b	i	pumps blood around whole body, not just lungs;  more muscle needed for higher pressure / to pump blood further / against higher resistance	1  1	
			ii	description: high pressure – body / low pressure lungs; explanation: e.g. high pressure damage capillaries in lungs / wall of lungs thin / high pressure needed to reach all parts of body; pressure cannot be maintained throughout in a longer, single circulatory system idea;	any 2	
			iii	reactants: haemoglobin + oxygen product: oxyhaemoglobin; (1)  symbol for reversible reaction: $\rightleftharpoons$ ; (1)	2	
<b>Total</b>				<b>10</b>		

Question			Expected answers	Mks	Additional guidance
4	a	i	ceramic tiles	1	
		ii	steel reinforced concrete	1	<b>Accept</b> steel mesh and concrete
		iii	steel (mesh)	1	<b>Accept</b> steel reinforced concrete
		iv	polymer (coating)	1	
	b	i	evaporation solution	2	
		ii	polymer becomes more flexible; plasticisers are small molecules; which go between polymer chains; so chains slide over each other more easily	<b>any</b> <b>3</b>	
		iii	esters	1	
<b>Total</b>				<b>10</b>	

Question			Expected answers	Mks	Additional guidance	
5	a	i	boiler; turbine; generator;	3	Allow (1) if correct words used, all in incorrect places	
		b	transmits / distributes electricity; connects power stations <u>s</u> to users <u>s</u> ; changing demand / fluctuating demand;			1
		ii	20,000 ÷ 40,000; 0.5			1 1
		iii	power = voltage x current	1		
	c	i	limited / finite supply / cannot be replaced / takes millions of years to form;	1		
		ii	energy value; availability; storage; power stations already built for coal;	any 2		
	d		biomass - top box; biofuel - bottom box;	2		
<b>Total</b>				<b>12</b>		

Question			Expected answers	Mks	Additional guidance	
6	a		not all plastics melt / not all thermoplastics; some are thermosets; weak forces between chains of some polymers; chains can move over each other (when heated). some polymers are cross linked; cross linked polymers burn before melting	any 3		
		b	i	shared pair makes bond; rest of molecule correct	2	
			ii	reactants: H <sub>2</sub> + Cl <sub>2</sub> ; product: HCl; balanced: H <sub>2</sub> + Cl <sub>2</sub> → 2HCl	3	
<b>Total</b>				<b>8</b>		

# Grade Thresholds

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

January 2010 Assessment Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B481	Raw	50	457	43	39	36	29	22	16	10	0
	UMS	100	90	80	70	60	50	40	30	20	0
B482/1	Raw	60				40	33	27	21	15	0
	UMS	69				60	50	40	30	20	0
B482/2	Raw	60	40	32	24	17	11	8			0
	UMS	100	90	80	70	60	50	45			0
B483	Raw	50	47	43	39	36	29	23	16	10	0
	UMS	100	90	80	70	60	50	40	30	20	0

## Entry Information

Unit	Total Entry
B481	3212
B482/1	5251
B482/2	1105
B483	479

## 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	3.8	8.1	15.0	45.6	73.8	92.5	98.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0

## Specification Aggregation Results

170 candidates were entered for aggregation this series.

For a description of how UMS marks are calculated see;  
<http://www.ocr.org.uk/learners/ums/index.html>

Statistics are correct at the time of publication.

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