

# **Applied Science Double Award**

General Certificate of Secondary Education **J649**

## **Mark Schemes for the Units**

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**June 2009**

**J649/MS/R/09**

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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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## GCSE Applied Science Double Award (J649)

### MARK SCHEMES FOR THE UNITS

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## B482/01 Foundation Tier

Question				Expected answers	Mks	Additional guidance
1	a	i		carbon dioxide; warm / 30°C; light; right / best / optimum conditions;	any 3	
		ii		photosynthesis	1	
		iii		oxygen; glucose;	2	
	b	i		nitrogen; phosphorus;	2	
		ii		for growth	1	
	c			fish might eat or damage plants / nutrients or CO <sub>2</sub> harmful to fish	1	<b>Ignore</b> light or temperature harmful to fish
					<b>10</b>	

Question				Expected answers	Mks	Additional guidance
2	a	i		polymer	1	
		ii		T F F T	3	all 4 correct = 3 3 correct = 2 1 / 2 correct = 1
		iii		don't need to cut it; less maintenance idea; more hardwearing; any weather; not damaged when wet;	any 2	<b>Accept</b> 'does not rot'
	b	i		melts	1	
		ii		not all polymers melt	1	
	c			make new product; test new product; specific properties to test e.g. strength; environmental monitoring; safety issues	2	
					<b>10</b>	

Question		Expected answers	Mks	Additional guidance	
3	a	fractional distillation	1		
	b	the tower is coolest at the top many of the products are flammable;	2		
	c	as fuels in named place eg; car; central heating; lorries; airplanes; as lubricating oils in named place e.g. car; making polymers;	any 2	product AND use for each mark	
	d	i	contain carbon / made from living things	1	
		ii	CH <sub>4</sub>	1	
	e	i	harm environment; named effect e.g. kill sea life; eyesore; leaks of oil; transport problems / noise idea;	any 2	
		ii	jobs / prosperity to local area	1	
			<b>10</b>		

Question		Expected answers	Mks	Additional guidance	
4	a	i	nitrogen; oxygen;	1 1	
		ii	carbon dioxide	1	Accept sulfur dioxide
	b	i	centre box – visible right hand box – radio	1 1	
		ii	number of cycles / waves per second / the number hertz	1	
		c	star; light year; expanding; big bang	1 1 1 1	
			<b>10</b>		

Question			Expected answers	Mks	Additional guidance
5	a	i	touch / direct contact;  droplets in the air / breathing / coughing / sneezing;  through cuts / bites;  passed in blood;  passed in sweat / saliva / spit;	any 2	<b>Ignore</b> washing hands
		ii	no touching / no direct contact / blood / sweat not transferred / not cut or injured	1	<b>Ignore</b> referee further away  <b>Ignore</b> air droplets / breathing / coughing / sneezing
	b		measles	1	
	c	i	<u>dead / weakened / part of virus / bacteria / microorganisms / microbe / cells</u> ;  (vaccine provides) antigens;  <u>injected</u> / taken orally;  antibodies produced (by the body);  <u>white</u> blood cells produce antibodies / <u>white</u> blood cells attack antigens;  gives immunity / works through the immune system / protected from the disease in the future;	any 3	<b>Ignore</b> small amount of...       <b>Ignore</b> wbc attack vaccine / disease     <b>Ignore</b> 'fights the disease next time'
		ii	not allowed to fight / wrestlers who fight are disease free;	any 1	<b>Ignore</b> treatment
	c		box 2 (waste products build up in cells); box 4 (less oxygen will be in the blood);	2	
				10	

Question			Expected answers	Mks	Additional guidance
6	a	i	1.35	1	if no final number given, <b>Accept</b> 1.7 - 0.35  <b>Ignore</b> units
		ii	wood frame (no mark)  loses less energy / heat;  lower U-value / quotes 4.8 and 5.7 / difference of 0.9;	2	<b>Ignore</b> conduction / insulation <b>Idea</b> of heat going through <b>Accept</b> keeps heat in
		iii	remove chimney / no chimney; more / thick (roof) insulation;	1 1	
	b	i	8	1	
		ii	10	1	
	c		convection	1	
	d	i	(single glazed) window, <u>metal</u> frame	1	
		ii	infrared / IR	1	
				<b>10</b>	

## B482/02 Higher Tier

Question			Expected answers	Mks	Additional guidance
1	a	i	1.35	1	if no final number given <b>Accept</b> 1.7 - 0.35  <b>Ignore</b> units
		ii	wood frame (no mark)  loses less energy / heat;  lower U-value / quotes 4.8 and 5.7 / difference of 0.9;	2	<b>Ignore</b> conduction / insulation <b>Idea</b> of heat going through. <b>Accept</b> keeps heat in
		iii	remove chimney / no chimney; more / thick (roof) insulation;	1 1	
	b	i	8	1	
		ii	10	1	
	c		convection	1	
	d	i	(single glazed) window, <u>metal</u> frame	1	
		ii	infrared / IR	1	
				<b>10</b>	



Question			Expected answers	Mks	Additional guidance
2	a	i	touch / direct contact;  droplets in the air / breathing / coughing / sneezing;  through cuts / bites;  passed in blood;  passed in sweat / saliva / spit;	any 2	<b>Ignore</b> washing hands
		ii	no touching / no direct contact / blood / sweat not transferred / not cut or injured	1	<b>Ignore</b> referee further away  <b>Ignore</b> air droplets / breathing / coughing / sneezing
	b		measles	1	
	c	i	<u>dead / weakened / part of virus / bacteria / microorganisms / microbe / cells;</u>  (vaccine provides) antigens;  <u>injected</u> / taken orally;  antibodies produced (by the body);  <u>white</u> blood cells produce antibodies / <u>white</u> blood cells attack antigens;  gives immunity / works through the immune system / protected from the disease in the future;	any 3	<b>Ignore</b> small amount of...       <b>Ignore</b> wbc attack vaccine / disease   <b>Ignore</b> 'fights the disease next time'
		ii	not allowed to fight / wrestlers who fight are disease free;	any 1	<b>Ignore</b> treatment
	d		box 2 (waste products build up in cells); box 4 (less oxygen will be in the blood)	2	
				<b>10</b>	

Question			Expected answers	Mks	Additional guidance
3	a	i	mixture of metals	1	
		ii	metal atoms have different sizes; prevents (layers of) atoms slipping	2	
	b	i	cross links shown;  layers closer together;  no water	any 2	<b>Do not accept</b> water symbols for cross links <b>Do not accept</b> layers with different thickness
			ii	more heat resistant / withstands <u>high</u> temperature / stronger / harder; due to cross links / bonds between layers	2
		iii	8	1	
				10	

Question			Expected answers	Mks	Additional guidance
4	a	i	nitrogen; oxygen; carbon dioxide; water vapour;	any 2	<b>Accept</b> argon <b>Accept</b> symbols
		b	wavelength - horizontal pointing to right; frequency - horizontal pointing to left;	1 1	<b>Allow</b> one mark if reversed
	c		gamma; x-ray; ultraviolet; <u>long wave</u> radio	any 2	<b>Accept</b> microwave
	d	i	$v = f\lambda$ / speed = frequency x wavelength	1	<b>Accept</b> correct re- arrangement
		ii	$v = 0.001 \times 3 \times 10^{11}$ <b>or</b> $3 \times 10^{11} \div 1000$ ; $v = 300,000,000$ or $3 \times 10^8$	1 1	correct numerical answer gains 2 marks
	e		4; 0.001; 300 billion;	1 1 1	in order
				12	

Question			Expected answers	Mks	Additional guidance									
5	a	i	inherited / passed down; via genes / alleles / chromosomes / in genetic makeup; defective genes / incorrect code not infectious / cannot catch it	any 2										
		i	recessive; dominant; heterozygous;	1 1 1	<b>Allow</b> one mark if dominant and recessive reversed									
	b	i	<table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td></td> <td style="text-align: center;">F</td> <td style="text-align: center;">f</td> </tr> <tr> <td style="text-align: center;">F</td> <td style="text-align: center;"><b>FF</b></td> <td style="text-align: center;"><b>Ff / fF</b></td> </tr> <tr> <td style="text-align: center;">f</td> <td style="text-align: center;"><b>Ff / fF</b></td> <td style="text-align: center;"><b>ff</b></td> </tr> </table>		F	f	F	<b>FF</b>	<b>Ff / fF</b>	f	<b>Ff / fF</b>	<b>ff</b>	1	all must be correct
	F	f												
F	<b>FF</b>	<b>Ff / fF</b>												
f	<b>Ff / fF</b>	<b>ff</b>												
		ii	ring around single letter of gametes	1										
		iii	meiosis	1										
		iv	ff	1	both lowercase									
		v	25% / 1 in 4 / 0.25 / ¼	1										
				<b>10</b>										

Question			Expected answers	Mks	Additional guidance
6	a		fractional distillation	1	
	b		the fractions solidify as they rise...  <b>the compounds in crude oil...</b> ✓  <b>the fractions condense at different...</b> ✓  the higher up the tower the higher...  the fractions are filtered in the tower	2	
	c	i	<b>C<sub>40</sub>H<sub>82</sub></b>	1	
		ii	greater / stronger / more intermolecular forces / needs more energy / heat to break bonds; due to larger size molecule / more atoms (in molecule)	2	
		iii	organic	1	
		iv	contains carbon	1	
				<b>8</b>	

# Grade Thresholds

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

June 2009 Assessment Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B481	Raw	50	45	42	39	36	29	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	69				60	50	40	30	20	0
B482/2	Raw	60	40	34	28	22	18	16			0
	UMS	100	90	80	70	60	50	45			0
B483	Raw	50	47	43	39	36	29	23	17	11	0
	UMS	100	90	80	70	60	50	40	30	20	0

## Entry Information

Unit	Total Entry
B481	6738
B482/1	5298
B482/2	1804
B483	8948

## 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 %	0.2	0.8	2.2	5.0	10.6	21.3	41.9	60.3	72.1	80.5	87.3	92.5	96.0	98.1	99.2

9286 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](http://www.ocr.org.uk/exam_system/understand_ums.html)

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