

## **Science B**

General Certificate of Secondary Education

Unit **B621/02**: Unit 1 Modules B1, C1, P1 (Higher Tier)

# **Mark Scheme for January 2012**

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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
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt <u>not</u> given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

## Subject-specific Marking Instructions

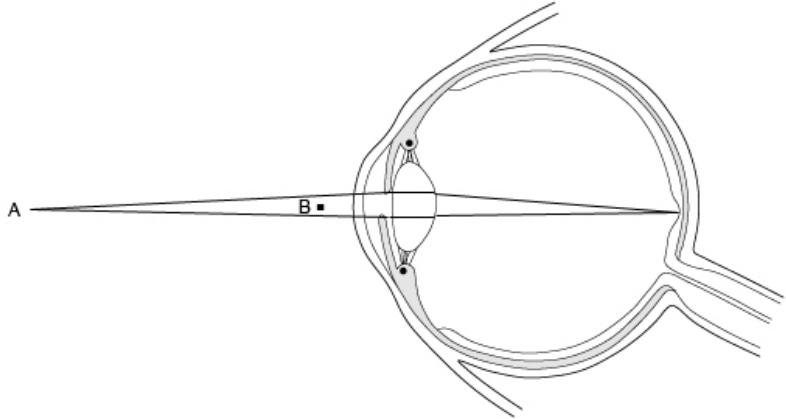
Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
allow	= answers that can be accepted
not	= answers which are not worthy of credit
reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant
( )	= words which are not essential to gain credit
<u>  </u>	= underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	= error carried forward
AW	= alternative wording
ora	= or reverse argument

Question		Expected Answers	Marks	Additional Guidance
1	(a)	Gazza (1)	1	
	(b)	(i) calculation: she needs 60g (1)	1	
	(ii)	answer (yes) because she is eating 62g (1)	1	<b>allow</b> ecf from b(i) check the answer is consistent with <b>b(i)</b> first <b>allow</b> she is eating more than RDA / 60g <b>ignore</b> she is eating enough
	(c)	emulsifying fat (droplets) / increasing the surface area of fat (droplets) / breaking down fat droplets (1)  lymph / lacteals (1)	2	<b>not</b> fats / fat molecules  <b>allow</b> neutralises acids / provides correct pH for lipase  <b>allow</b> lymphatic system / lymph capillaries <b>not</b> lymph glands
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	(i) alternative form of a gene (1)	1	<b>ignore</b> a type of gene <b>allow</b> a different type of one gene <b>ignore</b> gene unless qualified
		(ii) protein (1)	1	
	(iii)	less stress / less fat / cholesterol in diet / less alcohol / (more) exercise / less smoking (1)	1	<b>allow</b> relaxed lifestyle  <b>allow</b> less salt in diet <b>ignore</b> eating less sugar in diet / healthy diet / losing weight
	(b)	zero (1)  dominant (allele) so neither parent can have the syndrome (1)	2	can only score this mark if probability is correct
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	O <sub>2</sub> and CO <sub>2</sub> (1) correct balancing (1)	2	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> + 6O <sub>2</sub> -> 6CO <sub>2</sub> + 6H <sub>2</sub> O
	(b)	lactic acid levels do not get as high / lactic acid levels start to increase later in the race (1)  lactic acid causes pain / fatigue / cramp (in muscles) (1)	2	<b>allow</b> lactic acid is produced more slowly <b>ignore</b> lactic acid is not made  lactic acid is not produced so quickly so less pain in muscles = 2 marks
	(c)	anabolic steroids (1)	1	
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
4	(a) (i)		1	bending must coincide with the lens double lines drawn and not clear which is answer = zero lines must meet very close to retina and must meet in fovea (dip in retina) <b>allow</b> if lines are not drawn in lens
	(ii)	<b>any two from:</b> contraction of <u>ciliary</u> muscles (1) slackening of suspensory ligaments (1) lens becomes round(ed) / fat(ter) / wide(r) / thick(er) (1)	2	<b>ignore</b> ligaments relax
	(b)	long sight: eye or lens wrong shape (1)  red-green colour blindness: lack of certain cells / receptors in the <u>retina</u> / lack of cones (1)	2	<b>allow</b> lens too thin / not powerful enough eye too short / small (eye) muscles too weak  <b>allow</b> specific / certain cells in the retina not working any mention of rods negates this mark
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	takes a (much) longer time to be formed than it does to use (1)	1	<p><b>not</b> it cannot be used again  it is a fossil fuel is not sufficient</p> <p><b>ignore</b> it cannot be made again</p> <p><b>allow</b> it takes a long time to form / was made a long time ago</p>
	(b) (i)	<b>any two from:</b> boiling point increases as molecular size increases / ora (1) br/> boiling point increases as strength of intermolecular force increases / ora (1) br/> strength of intermolecular force increases as molecular size increases / ora (1)	2	<p><b>allow</b> boiling point increases as there are more intermolecular forces</p> <p><b>allow</b> more intermolecular forces as molecules get bigger</p> <p><b>allow</b> the use of the term force between the molecules rather than intermolecular force</p> <p><b>not</b> reference to bonds unless it is clear that it is bonds <b>between</b> molecules</p>
	(ii)	$C_8H_{18}$ (1)	1	<p><b>allow</b> <math>H_{18}C_8</math> / <math>C_2H_6</math> / <math>C_5H_{12}</math></p> <p>subscripts must be correct but allow different order of atoms</p>
	(c)	paraffin (1)	1	
		<b>Total</b>	<b>5</b>	





Question		Expected Answers	Marks	Additional Guidance
8	(a)	lime water (1)	1	<b>allow</b> other ways of indicating answer e.g. ringing or ticking the answer answer on answer line takes precedence
	(b)	$2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$ (1)	1	all formulae must be correct in terms of case and subscript
		<b>Total</b>	<b>2</b>	

Question		Expected Answers	Marks	Additional Guidance
9	(a) (i)	reference to trend for temperatures to be very high in recent years (1)	1	<b>allow</b> correct use of figures from graph e.g. average temperature in 2000 is higher than in 1880 (1)  <b>allow</b> correct average line drawn on the graph (1)  <b>allow</b> temperature is getting higher / increasing / is now the highest it has been (1) <b>ignore</b> it / the trend is increasing, unless qualified <b>not</b> the temperature is increasing every year
	(ii)	<b>any one from:</b> reference to temperatures being random year by year / large amount of variation (1)  the scale of 100 years on the time scale is not significantly long (1)  the temperature only increases by approximately $1.5^{\circ}\text{C}$ so not a significant increase (1)	1	<b>allow</b> correct use of figures from graph (1) <b>not</b> it / graph fluctuates or drops <b>allow</b> some years the temperature drops  <b>allow</b> only includes one stations recordings
	(b) (i)	reduced / causes cooling (1)	1	
	(ii)	<u>reflects</u> radiation (from town) back to Earth (1)	1	<b>ignore</b> traps heat / radiation <b>allow</b> heat / infra red
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	(i) no medium required (to transfer energy) / does not require particles (to transfer energy)/ conduction and convection require particles(1)	1	<b>ignore</b> can travel through space <b>ignore</b> does not need air or a specific medium
		(ii) (shiny) foil behind radiators (1)	1	<b>allow</b> put foil in cavity wall of house / in loft / under carpets (1) <b>allow</b> use reflective glass in windows (1) <b>allow</b> reduce area / size of window glass (1) <b>allow</b> reduce room temperature (1)
	(b)	(i) (warm air is) less <u>dense</u> (1)	1	<b>allow</b> reverse argument (1) <b>ignore</b> hot air rises <b>not</b> heat rises
		(ii) (£) 125 (1)	1	
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	angle of incidence is greater than critical angle / greater than (angle in range 40 - 42° ) (1)	1	<b>not</b> angle that it hits the surface (1)
	(b) (i)	analogue – any value / continuously variable (1) digital – on and off / 1 and 0 / only two values (1)	2	<b>allow</b> correct diagrams  <b>Analogue</b>  <b>digital</b> <b>allow</b> reference to range of values of wavelength / frequency / amplitude <b>not</b> just values vary
	(ii)	many separate signals sent together / sent at the same time (1)	1	
	(iii)	interference / noise can be removed easily (1)	1	<b>allow</b> less interference / noise in the output (signal) / AW (1) <b>allow</b> explanation involving noise not recognised and amplified (1) <b>ignore</b> good quality / less noise / less interference
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	$299\ 700\ 000 / 2.997 \times 10^8$ (1)	1	<b>allow</b> $300\ 000\ 000 / 3 \times 10^8$ (1)
	(b)	line of sight (1)  lack of / limited diffraction (1)	2	<b>allow</b> no buildings in way of transmission / so not reflected by buildings (1)  <b>allow</b> will not bend around buildings
	(c)	two from  it / mobiles frequencies are lower (1)  low frequencies have low energy (1)  it / mobiles microwaves have lower energy / power (1)  mass being heated in a microwave is significantly less than the mass of a human (1)	2	<b>allow</b> converse answers if referring to cookers  <b>allow</b> not the correct frequency to vibrate water molecules (1) <b>allow</b> mobiles have longer wavelength (1)  <b>allow</b> long wavelengths have low energy (1)  <b>not</b> strength  <b>allow</b> mass of a human is too large to be heated by a phone
			<b>Total</b> 5	

Question		Expected Answers	Marks	Additional Guidance
13		heat (1) temperature (1)	2	
			<b>Total</b> 2	

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