

# **Additional Science B**

General Certificate of Secondary Education

Unit **B623/01**: Modules B3, C3, P3 (Foundation Tier)

## **Mark Scheme for January 2012**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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 <b>not</b> 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
- = 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)	to swim / move (to egg) (1)	1	<b>allow</b> travel (1) <b>ignore</b> just 'fertilisation' <b>ignore</b> reference to speed <b>ignore</b> to get to the egg
	(b)	an egg (cell) / ovum (1) fertilisation (1) (cell) division / dividing (1)  differentiation (1)	4	<b>ignore</b> conception <b>allow</b> mitosis (1) <b>not</b> meiosis <b>allow</b> splitting (1) <b>allow</b> specialisation (1) <b>ignore</b> development
	(c)	replace worn out or dead cells / repair (1)	1	<b>allow</b> to fight disease (1) <b>allow</b> to produce more sperm cells (1) <b>not</b> to make more eggs <b>ignore</b> reproduction <b>ignore</b> stay healthy owtte
		<b>Total</b>	<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	<p><b>any one from:</b>            contain haemoglobin (1)            (biconcave) disc shape (1)</p> <p>lack of nucleus (1)            large surface area (to volume ratio) (1)</p> <p>permeable membrane (1)            thin membrane / short diffusion pathway / AW (1)</p>	1	<p><b>allow</b> dips or dents or doughnut shaped (1)  <b>allow</b> (bi)concave (1)</p> <p><b>ignore</b> references to holes</p>
	(b)	<p>not (as) able to fight disease /</p> <p>pathogens can multiply /            pathogens are not killed (1)</p>	1	<p><b>allow</b> virus / bacteria as alternative for pathogen (1)  <b>allow</b> get ill / get a disease (1)  <b>ignore</b> get infected  <b>allow</b> idea that infection can take hold / spread (1)  <b>allow</b> higher level answers e.g. no antibodies produced (1)  <b>ignore</b> die</p>
	(c)	(i)	1	<p><b>allow</b> (blood) pressure falls / (blood) flow stops (1)  <b>ignore</b> clots  <b>not</b> flows backwards</p>
		(ii)	1	<p><b>allow</b> phonetic spelling  <b>ignore</b> just 'plaque'</p>
	(d)	(i)	1	<p><b>allow</b> asexual reproduction / exact copy of <b>organism</b> (1)  <b>ignore</b> unqualified copying / identical copy / copy of DNA /            copy of gene  <b>ignore</b> produce clones</p>
		(ii)	1	<p><b>allow</b> changing genes / changing DNA / genetic            modification / GM (1)  <b>ignore</b> selective breeding</p>
			<b>Total</b>	<b>6</b>

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	smooth curve going through all points or at least touching every cross (1)	1	<b>allow</b>  <b>not</b> dot to dot <b>not</b> multiple lines <b>not</b> lines starting at 4,0
		(ii)	(no) might be faster just before / after pH 6 (1)	1	<b>allow</b> (no) not enough information / too few points (1) <b>allow</b> (yes) idea that pH 6 is the lowest point or pH 6 gives the fastest reaction or pH6 gives the shortest time (1) <b>ignore</b> less time
	(b)	(i)	<b>any two from:</b> in (small) intestine (1)  idea that absorbed or transferred into blood (1)  by diffusion (1)	2	<b>ignore</b> large intestine <b>allow</b> through villi (1)  <b>ignore</b> dissolved diffuse into blood = 2
		(ii)	<b>any one from:</b> <b>B</b> and <b>D</b> (1) <b>B</b> (1) <b>D</b> (1)	1	any reference to <b>A</b> or <b>C</b> scores (0)
	(c)	reference to DNA (1) found on a chromosome (1) in nucleus (1)	3	<b>allow</b> higher level answers: e.g. made from bases / A, T, C, G (1) <b>ignore</b> reference to protein / amino acids	
			<b>Total</b>	<b>8</b>	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	bromine (1)	1	<b>ignore</b> Br
		(ii)	gas (1)	1	
		(iii)	melting point increases (1) boiling point increases (1)	2	<b>allow</b> they (both) increase (2)
	(b)		sterilise water or AW /  to make plastics /  to make pesticides / to make disinfectant (1)	1	<b>allow</b> in (swimming) pools (1) <b>allow</b> making drinking water safe (1) <b>ignore</b> in a water works <b>ignore</b> clean water <b>allow</b> making a named plastic e.g. poly(chloroethene), PVC (1) <b>allow</b> DDT (1) <b>allow</b> TCP / (1) <b>allow</b> making bleach or in bleach (1) <b>allow</b> killing bacteria (1) <b>ignore</b> killing germs
			<b>Total</b>	<b>5</b>	

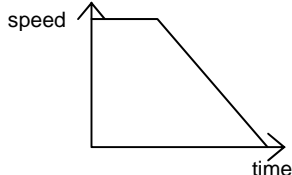
Question		Expected Answers	Marks	Additional Guidance
5	(a)	<p><b>up to two from:</b>  <b>appropriate</b> utensil used (1)</p> <p>dip utensil in (solid) chemical (1)  place (chemical) in Bunsen flame (1)</p> <p><b>up to two from:</b>  sodium (chloride) <b>flame</b> – yellow / orange (1)  potassium (chloride) <b>flame</b> – lilac / pink / purple (1)  lithium (chloride) <b>flame</b> – red / crimson (1)</p>	3	marks can be awarded from a <b>labelled</b> diagram <b>allow</b> wire / splint / spoon / spatula / tongs (1) <b>allow</b> (atomised) spray of solution introduced into flame (2) <b>ignore</b> references to cleaning utensil in acid / AW <b>ignore</b> reference to dipping in metal or element <b>allow</b> heat / burn (chemical) on gauze for a maximum of (1) <b>DO NOT AWARD COLOUR MARK UNLESS METHOD DESCRIBED WOULD PRODUCE A FLAME</b> flame can be implied from method IF NO METHOD DESCRIBED, <b>allow</b> mark(s) for results even if flame not mentioned <b>N.B. MAX 3</b>
	(b)	<u>alkali metals</u> (1)	1	<b>not</b> alkaline metals
	(c)	6 / six (1)	1	
<b>Total</b>			<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	(i) 16 (1)	1	
		(ii) oxygen / selenium / tellurium / polonium (1)	1	<b>allow</b> O / Se / Te / Po (1)
		(iii) 3 / 3 <sup>rd</sup> / third (1)	1	<b>allow</b> III (1)
	(b)	hydrogen nitrogen oxygen (1)	1	all three needed order unimportant
<b>Total</b>			<b>4</b>	



Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	goes cloudy / milky / white suspension / white precipitate (1)	1	<b>ignore</b> changes colour
		(ii)	broken down (1) at least two (1)	2	
	(b)		precipitate (1)	1	<b>allow</b> precipitation (1)
			<b>Total</b>	<b>4</b>	

Question			Expected Answers	Marks	Additional Guidance
8	(a)		gold (1)	1	<b>allow</b> Au (1)
	(b)		lithium (1)	1	<b>allow</b> Li (1)
			<b>Total</b>	<b>2</b>	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	frictional (1) increases (1)	2	
	(b)	lower acceleration / takes longer (time) (to reach 50km/h) (1)	1	<b>ignore</b> unqualified reference to speed <b>allow</b> after 15s speed is slower (1)
	(c) (i)	the speed of the lorry (1) how tired Cliff is (1)	2	2 correct and 1 incorrect = 1 2 correct and 2 incorrect = 0 1 correct and 1 incorrect = 1
	(ii)	bottom left graph 	1	more than one ringed = 0
<b>Total</b>			<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	30 (2) <b>but if answer is incorrect</b> 50 x 0.6 (1) J / joules (1)	3	<b>allow</b> phonetic spelling
	(b)	33.3 (W) (2) <b>but if answer is incorrect</b> 30 ÷ 0.9 (1)	2	<b>allow</b> 33 (2) <b>allow</b> 33.4 scores (1) <b>allow</b> ecf e.g. if answer to 10(a) is 45 then 50 scores 2
	(c)	decreases / AW (1) kinetic (1)	2	<b>allow</b> goes down / gets less (1) <b>allow</b> KE (1)
<b>Total</b>			<b>7</b>	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	absorb energy (1)	1	<b>allow</b> change shape / stretch (1) <b>allow</b> decreases acceleration / increases stopping time or distance (1) <b>ignore</b> keeps him in his seat
	(b)	crumple zone (1) air bag (1)	2	<b>allow</b> crush zone (1) <b>ignore</b> car crumples  <b>allow</b> (safety) cage / (anti) roll bar (1) <b>allow</b> collapsing steering column / wheel (1) <b>allow</b> padded dashboard / steering wheel (1) <b>allow</b> headrest (1) <b>allow</b> safety / laminated / shatterproof glass (1)  <b>N.B. DO NOT ALLOW ANY OTHER SAFETY FEATURE</b>  <b>allow</b> one safety feature with an appropriate clear explanation e.g. air bag inflates preventing you hitting the steering column (2)
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	petrol (1) diesel (1)	2	<b>allow</b> biodiesel (1) <b>but</b> not merely biofuel <b>allow</b> LPG (1)
	(b)	battery driven (1) solar / light energy (1)	2	<b>allow</b> hybrid (1) <b>ignore</b> unqualified charging
		<b>Total</b>	<b>4</b>	

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