

Additional Science B

General Certificate of Secondary Education

Unit **B624/01**: Modules B4, C4, P4

Mark Scheme for January 2011

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

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

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	3rd box / dead leaves (1) 4th box / grass cuttings (1)	2	if more than 2 ticks deduct one mark for each incorrect response
		(ii)	decomposers / bacteria / fungi / microbes (1)	1	ignore germs ignore factors that help decay, eg warmth / moisture / oxygen allow higher level answers: saprophytes / putrefying bacteria ignore detritivores / worms / woodlice
	(b)	(i)	Growth Boost / 5:2:2 (1)	1	
		(ii)	to dissolve / form a solution / to be absorbed (1)	1	allow spreads easier allow easier / quicker to absorb / gets into the plants easier allow reduce concentration / so it does not damage the plants allow soak up / suck up allow to reduce concentration / so does not damage plant
		(iii)	roots (1)	1	allow higher level answers: root hairs ignore just 'hairs'
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	produce biomass / make food / grow / absorb energy / make tomatoes (1)	1	ignore to stay alive allow to get their food allow higher level answers: make glucose / sugar / starch
		(ii)	chloroplast (1)	1	if no answer on the line, allow the correct answer circled, underlined or ticked on the diagram
	(b)		leaf (pores) (1)	1	allow higher level answers: stomata
	(c)		hydroponics (1)	1	
	(d)	(i)	biological control / farming (1)	1	allow predation
		(ii)	predators / carnivores (1)	1	allow consumers / secondary consumers
		(iii)	insecticide / pesticide (1)	1	ignore poison / toxin / named examples
			Total	7	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	biomass (1)	1	
	(b)	difficult to digest / contain little energy / nutrients (1)	1	allow higher level answers: contain a lot of cellulose allow do not contain a lot of sugar / fat / protein / starch ignore contains no fat / sugar / starch / protein ignore do not contain a lot of carbohydrate (cellulose) not contains no energy allow idea that lots of leaves are available so they don't need to move (much)
	(c)	any three from: lost from leaves / stomata (1) by diffusion / by evaporation (1) moves through xylem (1) (water) enters / absorbed by roots / root hairs (1) by osmosis (1)	3	allow through guard cells ignore if linked to other parts of the plant other than leaves ignore just moves through roots or from roots to stem ignore unless linked to water absorption or movement in roots
	(d)	any two from: wide / broad / large surface (area) - to absorb (sun)light / energy / for gas exchange / absorb carbon dioxide / lose oxygen (1) thin – for gas exchange / absorb carbon dioxide / lose oxygen / gases or light can reach all layers of leaf (1) veins – idea of support / transport (1)	2	need adaptation and explanation for each mark ignore long ignore sun allow stomata - gas exchange / absorb carbon dioxide / lose oxygen allow chlorophyll / chloroplasts - absorb light ignore green - to absorb light allow transparent cuticle / upper epidermis / top layer of cells - to allow light to reach palisade cells / chloroplasts
		Total	7	

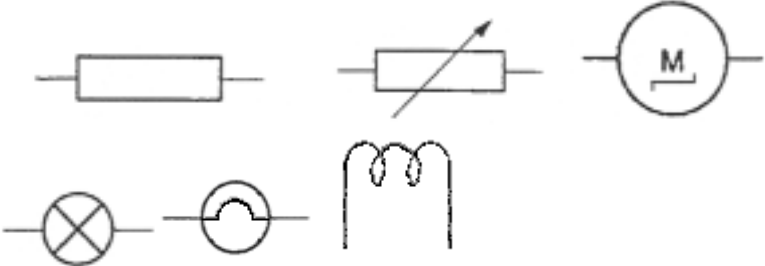
Question		Expected Answers	Marks	Additional Guidance
4	(a)	40(°C) (1)	1	allow any temperature from 25°C to 40°C
	(b)	active detergent - does the cleaning bleaches - removes coloured stains enzymes - used in low temperature washes to remove food stains all 3 correct = 2 marks 1 or 2 correct = 1 mark	2	mark as incorrect any answer with more than one line from the left hand boxes
	(c)	does not use water / AW (1)	1	allow stain will not dissolve in water allow uses an organic solvent / uses solvent that is not water allow do not get wet not does not use a lot of water / uses steam not just use solvent
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	to increase crop yield / to improve crop quality / to speed up /improve crop growth (1)	1	allow grow bigger crops allow to make more money allow higher level answers in terms of replacing essential elements used by a previous crop or providing essential elements ignore to get better crops ignore just to help plants / crops grow - must be idea of faster growth
	(b)	it is neutral (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(c)	white precipitate / white solid (1)	1	allow turns milky / cloudy / turbid /cream not changes colour or any named colour
	(d)	60(%) scores (2) BUT $\frac{\text{actual yield}}{\text{predicted yield}} \times 100$ or (2.1/3.5) x 100 scores (1)	2	look for correct answer first, 60(%) on own scores (2) unit not needed - ignore incorrect units allow am/pm x 100 (1)
	(e)	132 (1)	1	
		Total	6	

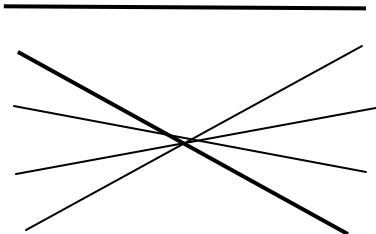
Question		Expected Answers	Marks	Additional Guidance
6	(a)	Idea that it is used as raw material / as a coolant / as a solvent / to dilute / dissolve / AW(1)	1	allow to make steam ignore clean except if justified allow correct named examples
	(b)	lead compounds (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(c)	(clean water) does not contain microbes or bacteria / (clean water) is not contaminated by sewage / people may become ill or die from drinking polluted water / AW (1)	1	allow any reasonable, but qualified, reference to a health issue ignore harm or dangerous unless qualified ignore answers related only to water
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
7	(a)	diamond (1)	1	allow soot
	(b)	slippery / layers or molecules slide past each other / weak bonds between layers / weak intermolecular forces between the layers (1)	1	ignore soft / easily rubs off ignore just weak bonds or weak intermolecular forces
	(c)	(very) strong / conduct electricity (1)	1	allow can cage a molecule / can act as a catalyst / large (internal) surface area ignore very small ignore hard not hard to break
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	air	1	allow atmosphere
	(b)	(reaction can) go in both directions / (reaction goes) both ways (1)	1	allow equilibrium / either way allow products go to reactants (as well) allow can go back to its original state / how it started / reaction can be undone / reaction can go forwards and backwards ignore can be reversed
	(c)	any two from: (starting) materials / (raw) materials / nitrogen / hydrogen (1) energy / electricity (for running machines) / gas (1) labour / salaries / workers (1) rent / rates / taxes / insurance (1) plant / buildings / machinery / equipment (1) maintenance / repair / health & safety (1) pollution controls / safety / security (1) Quality Control (1)	2	allow (cost of) water for rates or for starting materials (make your decision to give candidate maximum marks) allow cost of pressure / temperature ignore transport / packaging allow higher level qualification of costs for a second mark
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	A (1)	1	mark answer on line allow answer ringed or underlined if no answer on line.
	(b)	there is no battery in that part of the circuit / it is cut off from the power supply(1)	1	allow zero voltage / shorted out / AW not the circuit is not complete, unless qualified
	(c)	resistor / resistance (1)	1	allow any suitable component that would work, eg another lamp / coil of wire / electric motor/dimmer switch not capacitor allow correct component drawn on diagram eg 
	(d)	6 ohms (2) but if answer incorrect $1.5 / 0.25 = (1)$	2	
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	positive and negative / +ve and -ve / + and - (1)	1	either order, both needed
	(b)	any three from: clothes made of insulators / synthetic fibres (1) insulators of different materials (1) rub against each other / skin / hair (and become charged) (1) idea that charge flows through body (1) charge flows to earth (1)	3	allow higher level answers in terms of transfer of electrons max 3 eg insulators rub together (1) electrons move from one material to another (1) electrons flow through the body (1) electrons flow to earth (1) these answers can be mixed with low level answers allow correct named materials eg wool / silk / cotton / nylon / polyester / terylene / acrylic allow friction if qualified allow she becomes earthed
	(c)	photocopiers / defibrillators / static/ special dusters / inkjet printers (1)	1	allow correct description ignore sticking balloons / hair standing on end
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	<p>frequency number of vibrations each second</p> <p>compression region where the particles in the wave are close together</p> <p>rarefaction region where particles in the wave are far apart</p>  <p style="text-align: right;">(2)</p>	2	<p>one or two correct = (1)</p> <p>all correct = (2)</p> <p>mark as incorrect any left hand box with more than one line.</p>
	(b)	28 000 Hz (1)	1	if no answer on the line allow correct answer ticked, underlined or circled on the list
Total			3	

Question			Expected Answers	Marks	Additional Guidance
12	(a)	(i)	nucleus (1)	1	ignore centre / middle / core
		(ii)	idea that: α particle cannot penetrate skin / cannot get out of body / cannot be detected outside body (1)	1	allow high level ideas eg more energy / too ionising / ignore merely dangerous / harms the body ignore not very penetrating / not very strong unless qualified by reference to the body
		(iii)	reduces AW	1	not decays / weakens /loses /not as strong
	(b)		alpha (1)	1	allow symbol if no answer on the line allow correct answer ticked, underline or circled on the list
			Total	4	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	(nuclear) fission (1)	1	not fusion allow chain reaction
	(b)	neutrons (1)	1	
	(c)	radiation in atmosphere / air / surroundings / that is always present / (1)	1	allow higher level answers eg examples of sources
		Total	3	

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