UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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for the guidance of teachers

0654 CO-ORDINATED SCIENCES

0654/31 Paper 31 (Extended Theory), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Page 2	Mark Scheme: Teachers' version IGCSE – May/June 2010	Syllabus 0654
(a) (i) Ca	nd D ;	cannb.
(ii) A a	.nd D ;	10
whe	ens and closes ; en atrium contracts valve is pushed open ; en ventricle contracts valve is pushed shut ;	Syllabus 0654 (max 2]
idea tha	kygen (in right side of heart in fetus) ; at it is a mix of oxygenated blood (from placenta) ody tissues) ;) and deoxygenated [2]
(c) (i) hae	emoglobin ;	[1]
(ii) prot	tein ;	[1]
(iii) iron	ı;	[1]
	all particles/not made of large molecules ; can be absorbed as they are ;	[2]
	respiration/to combine with glucose ; elease energy/to provide energy ;	[2]
		[Total: 13]
	uses, skin cancer/eye damage/burns/mutation in sk skin ;	kin / damage to DNA [1]
	tective clothing/sun block ;	[1]
(b) (speed = = 300 m	=) distance/time ; n/s ;	[2]
• • •	ntum =) mass × velocity ; 00 × 60 = 24 000 000kgm/s ;	[2]
	symbols correct ; symbols connected in series ;	[2]
(ii) 6∨		[1]
	n transfer ; ains electrons / tent loses electrons / or vice versa ; on between surfaces ;	[3]

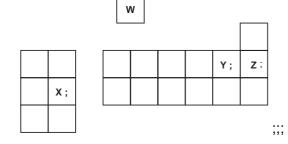
				444	
	Page		Mark Scheme: Teachers' version	Syllabus 7.0 r	
			IGCSE – May/June 2010	0654	
	(f)	two	straight parallel rays drawn entering the lens ; straight rays brought to a focus at the twigs/grass ; ws correctly shown ;	Syllabus 0654 apacambridge.col.	~
			lens	vigs/grass	
				[Total: 15]	
3	(a)		sing ; oves electrons ;		
		dan	ages DNA/mutation ; ct (e.g. cancer/burns/radiation sickness) ;	[max 3]	
	(b)	(i)	<u>nuclei</u> split/ <u>nuclear</u> fission ;	[1]	
		(ii)	nuclear/radioactive/toxic waste ; problems of disposal/storage ; or security of fissionable/radioactive material ; use in terrorism ; or		
			accident/malfunction ; effect of radioactive materials on environment/humans	; [max 2]	
				[Total: 6]	
4	(a)	• •	reaction is exothermic/heat was given off ;	[1]	
		(ii)	temperature falls (after 25 cm ³ of acid added) ; so no further (exothermic) reaction/all alkali used up ;	[2]	

 (i) moles of A ((25.0/1000) × 0.2 =) 0.005; moles KOH ((20.0/1000) × 0.5 =) 0.01; (allow 1 mark if the same error in converting to dm³ is made in each calculation, e.g. if left in cm³ answers are 5 and 10) (ii) (0.5) (no mark) [e.c.f. from (i) provided answer is <u>half</u> the KOH moles] because the number of moles of acid must be half the number of moles of KOH / owtte / or relevant working; [1] (iii) H⁺ + OH⁻ → H₂O (all correct for 2 marks, two of the three for 1 mark);; [2] (i) electrolysis; [1] (ii) plate, has a negative charge / is negative, and potassium ions, are positively charged/are positive; opposite charges attract/potassium ions move towards the plate; potassium ions gain electrons from the plate; potassium ions, discharged/gain one electron/become atoms; [Total: 12] (i) foam/air, is a poor <u>conductor</u>; foam, stops <u>convection</u> of air/traps air; radiation reflected by, shiny surfaces/foil/metal; [3] (ii) B (no mark) turns ratio 2:1; [1] (iii) water can conduct electricity; danger of electrocution; [2] 	Page 4	Mark Scheme: Teachers' version	Syllabus
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still an electromagnet (so still attracts bolt) ; [1]	• • •		net ; [1
(iv) more coils / higger voltage / higger core :			[1

 (a) (i) ammonium/NH4[*]; (ii) shortage of something in the soil; nitrogen/nitrate, needed for making, protein/amino acids; proteins for growth : detail, e.g. more cells/more cytoplasm; correct ref. to function of P or K; (iii) wheat - little/no, difference; potatoes - greater, with manure + bacteria/in plot B; 10.50 tonnes (per hectare per year) (greater); (iv) manure contains plant and animal waste e.g. proteins/urea; which needs to be, broken down/decomposed (by bacteria); to produce, ammonia/nitrates/something that can be used by plants; reference to nitrification/nitrifying bacteria; (b) stimulates growth of, algae/plants; plants/algae, die; fed on by bacteria/decomposers; which respire (aerobically); bacteria use oxygen; (ii) proteins contain, S/sulfur; only proteins contain, S/sulfur; only proteins contain, S/sulfur; only proteins contain, S/sulfur; molecules/particles, can move past one another easily; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container; molten nylon can be pumped (through small holes); molten threads solidify when cooled; strong forces between molecules when solid; (ii) doesn't melt (on contact with hot containers); molecules/particles, can move past one another; bacause strong bonds hold polymer chains/crosslinks; (iii) doesn't melt (on contact with hot containers); molecules and the pumped (through small holes); molten right contain two past one another; bacause strong bonds hold polymer chains/crosslinks; (iii) doesn't melt (on contact with hot containers); molten and the contain two past one another; bacause strong bonds hold polymer chains/crosslinks; (iiii doesn't melt (on contact with hot containers); molten diagram could score crosslink mark] 	 (iii) wheat – little/no, difference; potatoes – greater, with manure + bacteria/in plot B; 10.50 tonnes (per hectare per year) (greater); (iv) manure contains plant and animal waste e.g. proteins/urea; which needs to be, broken down/decomposed (by bacteria); to produce, ammonia/nitrates/something that can be used by plants; reference to nitrification/nitrifying bacteria; (b) stimulates growth of, algae/plants; plants/algae, die; fed on by bacteria/decomposers; which respire (aerobically); bacteria use oxygen; (i) glucose; (ii) protein; only proteins contain, S/sulfur; only proteins contain, N/nitrogen; (j) (i) molecules have only weak forces between them; molecules/particles, can move past one another easily; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container; molten nylon can be pumped (through small holes); molten threads solidify when cooled; strong forces between molecules when solid; (ii) doesn't melt (on contact with hot containers); molecules cannot move past one another; because strong bonds hold polymer chains/crosslinks; 	Paç	ge 5	Mark Scheme: Teachers' version	Syllabus	2
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 only proteins contain, S/sulfur; only proteins contain, N/nitrogen; (i) molecules have only weak forces between them; molecules/particles, can move past one another easily; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container; molten nylon can be pumped (through small holes); molten threads solidify when cooled; strong forces between molecules when solid; (ii) doesn't melt (on contact with hot containers); molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks; [max 2] [clear diagram could score crosslink mark] 	 (b) (i) molecules have only weak forces between them ; molecules /particles, can move past one another easily ; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container ; molten nylon can be pumped (through small holes) ; molten threads solidify when cooled ; strong forces between molecules when solid ; (ii) doesn't melt (on contact with hot containers) ; molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks ; [clear diagram could score crosslink mark] 	(a)	(i)	glucose ;		[1]
 molecules/particles, can move past one another easily; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container; molten nylon can be pumped (through small holes); molten threads solidify when cooled; strong forces between molecules when solid; (ii) doesn't melt (on contact with hot containers); molecules cannot move past one another; because strong bonds hold polymer chains/crosslinks; [max 2] [clear diagram could score crosslink mark] 	 molecules/particles, can move past one another easily ; therefore (solid) nylon, melts / becomes a liquid, when heated / it enters the hot container ; molten nylon can be pumped (through small holes) ; molten threads solidify when cooled ; strong forces between molecules when solid ; [max 3] (ii) doesn't melt (on contact with hot containers) ; molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks ; [max 2] 		(ii)	only proteins contain, S/sulfur ;		[3]
molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks ; [max 2] [clear diagram could score crosslink mark]	molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks ; [max 2] [clear diagram could score crosslink mark]	(b)	(i)	molecules/particles, can move past one another easily; therefore (solid) nylon, melts / becomes a liquid, when the hot container; molten nylon can be pumped (through small holes); molten threads solidify when cooled;		s [max 3]
[Total: 0]	[Total: 9]		(ii)	molecules cannot move past one another ; because strong bonds hold polymer chains/crosslinks ;		[max 2]
						[Total: 0]

Pa	ge 6	Mark Scheme: Teachers' version	Syllabus	3. V
		IGCSE – May/June 2010	0654	Da
(a)	A to retir	na :		an.
	B to option	•		101.
	C to iris ;			19
(b)	ciliary mu	uscles, contract/get shorter;		apacambride
(-)		ension on) (suspensory) ligaments ;		
		e rounded/fatter;		
	more ref	raction/shorter focal length ;		
	light (ray	s) brought to a focus <u>on the retina</u> ;		[max 3]
		· / · · · · · · · · · · · · · · · · · ·		
(C)		rosis/sickle cell anaemia/thalassaemia/other; nt as to whether allele is dominant or recessive;		
		xamples are all recessive. Huntington's is dominal	nt)	
	·	, c		
	if recess		. /	
		ents must have allele for offspring to inherit disease genotypes and offspring genotypes shown / 1 in 4		
	having d			
	or			
	if domina	ant		
	only one	parent needs to have allele for offspring to inherit	disease ;	
	parental	genotypes and offspring genotypes shown / 1 in 2	2 chance of offspring	
	having d	isease ;		[max 3]

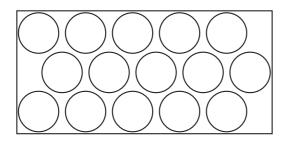
9 (a)



[3]

[1]

(b) (i) atoms all same size arranged in regular lattice ; e.g.



 (ii) reference to delocalised electrons ; movement of charge/electrons ;

[2]

