

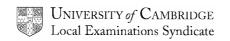
INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK:

SYLLABUS/COMPONENT: 0654/01

CO-ORDINATED SCIENCES
Paper 1 (Multiple Choice)



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	1

Question Number	Key	Question Number	Key
1	В	21	В
2	D	22	Α
3	В	23	С
4	С	24	С
5	D	25	Α
6	В	26	D
7	В	27	С
8	С	28	Α
9	С	29	С
10	С	30	D
11	С	31	В
12	Α	32	Α
13	С	33	Α
14	В	34	С
15	Α	35	Α
16	В	36	В
17	В	37	В
18	Α	38	С
19	Α	39	В
20	С	40	В



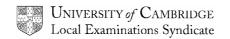
INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK:

SYLLABUS/COMPONENT: 0654/02

CO-ORDINATED SCIENCES (DOUBLE AWARD)
Paper 2 (Core)



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	2

1	(a)(i)	cell/plasma, membrane; cytoplasm;		2
	(ii)	no cell wall; no vacuole ;		2
	(b)	makes mucus; which traps, dirt/bacteria; keeps lungs clean;	2 max	2
	(c)	cilia (normally) sweep mucus upwards; mucus now collects in lungs; bacteria live in it/bacteria collect in lungs; coughing/poor gas exchange/shortness of breath;	3 max	3
2	(a)	all symbols correct;; lose one mark for one mistake accurate diagram;		3
	(b)	more cells/reduce resistance/remove lamp/remove resistor/incr voltage;	rease	1
	(c)(i) (ii) (iii)	decreases - resistance of circuit higher; decreases - resistance of circuit higher; gets dimmer - less current flowing/less voltage across lamp;		3
3	(a)(i)	reference to ignition; (squeaky) pop;		2
	(ii)	measure time for a certain volume to be collected; the more gas collected per unit time the higher the rate; some reference to 'fair test' e.g. same temp/surface area/concentration of acid;		3
	(b)	rusting prevented if attached metal is more reactive than iron; iron rusts if attached metal is less reactive than iron; rusting is worse than control if less reactive metal is attached;	2 max	
4	(a)(i)	distance = speed x time; distance = 330 x 0.2 = 66m; moth is 33m away;		3
	(ii)	series of compressions and rarefactions; or air particles vibrate; this vibration is passed on from one particle to the next;		2
	(iii)	more waves; same amplitude;		2

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2003	0654	2

	(b)	kinetic energy = $^{1}/_{2}$ mv ² ; = 0.5 x 2.5/1000 x 3 x 3; (or for converting g to kg); = 11.25 x 10^{-3} J;		3
5	(a)(i)	7.5;		1
	(ii)	bacteria act on food; produce acids;		2
	(iii)	line higher than original; accept either going up, or going down less		1
	(iv)	increases pH/reduces acidity; by neutralisation; by removing, food/bacteria; less acid to damage teeth; by, acting on/reacting with/dissolving, enamel;	3 max	3
	(b)(i)	one of the front two teeth labelled;		1
	(ii)	chewing/crushing/grinding; breaks food down into smaller pieces; increase surface area of food; so enzymes can act on it more, rapidly/easily;	2 max	2
	(iii)	food gets stuck, in depressions on tooth surface/between teeth; food in contact with teeth for longer;		2
6	(a)(i)	phosphorus/sulphur/chlorine/argon;		1
	(ii)	tin/lead;		1
	(iii)	four; Si in group IV outer electrons same as group number;		2
	(b)(i)	mixture B will be coloured and A will be colourless; B contains a transition metal compound/an iron compound;		2
	(ii)	giant structure; disorderly arrangement of atoms;		2
	(c)	conserves raw materials; avoids damage to landscape; removes waste glass/reference to reducing (dangerous) waste; uses less energy (per kg of glass)/less fossil fuel used per kg;	2 max	2
7	(a)	A a mirror; light is reflected;		
		B a glass or perspex block/lens etc; light is refracted;		4

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2003	0654	2

	(b)	ray is a series of straight lines; reflected off surface; at correct angles;		3
8	(a)(i)	water; air; fire;		3
	(ii)	any element; substance which; cannot be made simpler/be broken down and further/ contains only one type of atom;		2
	(b)(i)	protons; neutrons;		2
	(ii)	electrons;		1
	(iii)	gains (one) electron/achieves eight electrons in outer shell;		1
9	(a)	water; oxygen; carbohydrate/sugar/glucose/starch; all three for two marks, two for one mark		2
	(b)	absorb sunlight; not 'attract' provides energy for reaction; allows plants to use energy; able to use sunlight;	max 2	2
	(c)(i)	phloem;		1
	(ii)	for respiration; to provide energy; or for nectar; to attract insects to flower; or for stigma; to stimulate pollen to germinate;		2
	(d)(i)	fewer plants means less carbon dioxide absorbed; so carbon dioxide in atmosphere may increase; if trees burnt then carbon dioxide released; carbon dioxide is a greenhouse gas/words to that effect; more heat trapped in atmosphere;	3 max	3
	(ii)	loss of, habitat/food; animals become extinct; may lead to drier atmosphere; plants/animals, short of water;	2 max	

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2003	0654	2

10	(a)(i)	work = force x distance; = 650 x 50; = 32500J;		3
		- 023000,		3
	(ii)	gravitational potential energy etc;		1
	(b)(i)	need large pressure to get stick into ice/snow; gets this with a small area; use less force;	max 2	2
	(ii)	stick only needs to go in a few centimetres then stop; disc reduces pressure - larger area;		2
	(c)	reduce friction;		1
11	(a)	water/rain enters tiny cracks and may freeze; expansion (of ice) deepens cracks; or		
		heat/sun causes rock to expand; this causes rock to crack/weaken;		
		or		
		sand/dust carried by wind; hits rock weakening it/damaging surface;	2 max	2
	(b)(i)	reacts with soap/forms scum with soap/ reduces ability of soap to clean things;		
		causes limescale in hot water systems/reduces efficiency of water heating/blocks pipes/scales kettles;		2
	(ii)	boil it/distill it/use ion exchange/use washing soda;		2
	(c)(i)	(thermal) decomposition;		1
	(ii)	add acid to solid; if gas/CO ₂ evolved then solid is a carbonate;		2



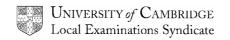
INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 110

SYLLABUS/COMPONENT: 0654/03

CO-ORDINATED SCIENCES (DOUBLE AWARD)
Paper 3 (Extended)



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

1 (a) sawdust has greater surface area; so higher rate of reaction; [2] (b) in (primary) cell reactants are used up/reaction cannot be reversed; car battery is rechargeable (by the engine); [2] (c) glowing splint tests for (free) oxygen; in water oxygen is combined; 2 max heating does not decompose water; (d) MgO has giant structure/many strong bonds; much energy needed to break bonds; CO₂ is simple molecular/weak forces between molecules; less energy needed to break bonds; 3 max 2 (a) ray bent in the correct direction and dispersed at first surface; ray bent in the correct direction and dispersed at second surface; red at top and blue at bottom; [3] have a different, frequency/wavelength; (b) [1] (c) equation $v = f\lambda$ stated in any form; *ignore formula triangles* correct substitution, e.g. $f = 3 \times 10^8 \div 6 \times 10^{-7}$; $5 \times 10^{14} \text{ Hz/}5 \times 10^{11} \text{ kHz};$ [3]

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

3

(a)(i)	reflex (action);	[1]
(ii)	sensory, relay/intermediate, motor;;	
	all correct for 2 marks	
	2 in correct sequence relative to each other for 1 mark	[2]
(b)(i)	mass converted to newtons/20 used in calculation;	
	F = 20 x 30 ÷ 5/any correct working;	
	= 120 N;	[3]
(ii)	1 food/glucose/carbohydrate;	
	2 respiration/combined with oxygen/oxidised;	
	3 in the (muscle), tissue/cells/mitochondria;	
	4 idea that the energy originated in the Sun;	
	5 Sun's/light, energy converted to chemical energy by photosynthesis;	max 3
(iii)	when one contracts the other relaxes;	
	(contraction of) one causes bending while the other causes straightening;	[2]

4	(a)(i)	cracking;	[1]
	(ii)	one mark for each entirely correct;;	[2]
	(b)(i)	(molecular mass of ethane =) 30; $300 \div 30 = 10$;	[2]
	(ii)	9;	[1]
	(iii)	(molecular mass of ethene =) 28; 9 x 28 = 252 g;	[2]
	(c)(i)	reaction with steam; in presence of catalyst; ref. to addition reaction;	2 max
	(ii)	must be unsaturated/unsaturated/alkene; undergoes addition reaction with bromine;	[2]
	(d)	melts/becomes softer; as molecules separate and move; only relatively weak attractive forces between molecules;	2 max

Mark Scheme

IGCSE EXAMINATIONS – NOVEMBER 2003

Syllabus

0654

Paper

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

5 (a)(i) friction;

as clothes rub against, one another/plastic door;

electron transfer;

[2]

(ii) electrons;

[1]

(b)(i) 2000;

[1]

(ii) 2000 W/Js⁻¹;

[1]

(iii) substitution, e.g. 2000 = 250 x current;

current = 8 \underline{A} ;

[2]

(iv) $I = V \div R$;

250/125 = 2 A;

[2]

Page 5	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

6	(a)(i)	CU	rve rises then, flattens/falls;	
		S	shaped;	[2]
	(ii)	pc	oint at which the curve <u>begins</u> to flatten/fall;	[1]
	(b)(i)	а	change in, genetic material/DNA/genes/chromosomes;	
		su	ndden/random/unpredictable;	[2]
	(ii)	1	allele a/ allele (for long hair), is recessive;	
		2	no goat in the next generation could be aa;	
		3	all goats in the next generation will be Aa or AA;	2 max
	(iii)	1	two heterozygous goats/Aa and Aa, could breed together;	
	, ,		some gametes from each will contain allele a;	
			so some offspring will be aa;	
		ta	ke from written explanation and/or genetic diagram	[3]
	(c)(i)	1	long hair, provides insulation/traps warm air;	
	, , , ,	2	less heat lost from body of long-haired goat;	
		3	food required to generate heat;	
		4	by respiration;	
		5	if less heat lost then less heat needs to be produced (to keep temperature constant);	3 max
	(ii)	1	long-haired goats more likely to survive/vice versa;	
		2	when food is in short supply/when weather is cold/during winter;	
		3	so they breed;	
		4	passing on their alleles/genes, to their offspring;	
		5	this happens over several generations;	
		6	this is <u>natural selection</u> ;	3 max

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			IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3
7	(a)(i)	3	O ₂ and 2 SO ₂ ;		[1]
	(ii) to	o unreactive/strong bonds in N ₂ ;		[1]
	(b)(i)	ziı	nc oxide + sulphuric acid → zinc sulphate + water;;		[2]
	(ii) ne	eutralisation;		[1]
	(c)	1 2 3 4	zinc ion moves to cathode/negative electrode; because opposite charges attract; gains electrons (from cathode); each ion gains two electrons;		
		5	becomes neutral/electrons cancel ionic charge;		4 max
	(d)	,,	elatinous) white, precipitate/solid; e-)dissolves in excess;		[2]
	(e)	1	brass is less malleable than pure metal/more difficult chance of damage when connection is made; diagram of pure metal showing atoms all the same sinote - must be regularly arranged and touching		SS
		3	reference to slippage of atoms (under pressure);		

4 diagram of allow with atoms of different sizes;

5 reference to greater difficulty of slippage;

Mark Scheme

Syllabus

Paper

3 max

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	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3
(a)	cosmic radiation/the Sun; not sunlight		[1]
(b)(i)	2600 cps ± 100;		[1]
(ii)	52 s ± 1;		
	working (on graph or with answer);		[2]
(iii)	(atoms containing) same number of protons;		
	different number of neutrons;		[2]
(c)(i)	ionising;		
. , . ,	damages, DNA/genes/chromosomes;		
	causes mutations;		
	causes cancer;		
	harms/kills, cells;		2 max
(ii)	alpha particle contains 2 protons and 2 neutrons;		
	radon 220 contains 86 protons and 134 neutrons;		
	so atom now contains 84 protons and 132 neutrons;		
	allow ecf if radon 220 p and n incorrect		[3]
	(a) (b)(i) (iii) (c)(i)	(a) cosmic radiation/the Sun; not sunlight (b)(i) 2600 cps ± 100; (ii) 52 s ± 1; working (on graph or with answer); (iii) (atoms containing) same number of protons; different number of neutrons; (c)(i) ionising; damages, DNA/genes/chromosomes; causes mutations; causes cancer; harms/kills, cells; (ii) alpha particle contains 2 protons and 2 neutrons; radon 220 contains 86 protons and 134 neutrons; so atom now contains 84 protons and 132 neutrons;	(a) cosmic radiation/the Sun; not sunlight (b)(i) 2600 cps ± 100; (ii) 52 s ± 1; working (on graph or with answer); (iii) (atoms containing) same number of protons; different number of neutrons; (c)(i) ionising; damages, DNA/genes/chromosomes; causes mutations; causes anutations; causes cancer; harms/kills, cells; (ii) alpha particle contains 2 protons and 2 neutrons; radon 220 contains 86 protons and 134 neutrons; so atom now contains 84 protons and 132 neutrons;

Mark Scheme

Syllabus

Page 8	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

9	(a)	1 cell wall is outside cell membrane;	
		2 cell wall is made of cellulose;	
		3 cell wall is (fully) permeable;	
		4 cell membrane is made of, protein/lipids;	
		5 cell membrane is thinner than cell wall;	
		6 cell membrane is partially permeable;	
		7 cell membrane is more flexible than cell wall;	
		8 cell wall stops cell bursting (when full of water); 3	max
	(b)(i)	1 osmosis;	
		2 through partially permeable (cell) membrane;	
		3 down, diffusion/concentration, gradient;	
		4 concentration of solution is higher inside the cell than outside; 3	max
	(ii)	in xylem vessels;	
		by mass flow;	
		pulled by transpiration stream; 2	max
	(c)	cells lose water;	
		cells, become flaccid/lose turgor;	[2]

Page 9	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	3

10 (a) pointer moves one way;

then in the opposite direction;

[2]

(b) magnetic (field) strength;

number of turns (of coil);

speed of turning; 2 max

- (c) 1 correct diagram of transformer with iron core and two sets of coils;
 - 2 more turns on secondary coil than on primary;
 - 3 primary coil voltage changes;
 - 4 which causes change in magnetic field;
 - 5 which induces current in secondary coil;
 - 6 producing secondary coil voltage;
 - 7 ref. to a.c.; 5 max



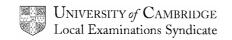
INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 45

SYLLABUS/COMPONENT: 0654/05

CO-ORDINATED SCIENCES (DOUBLE AWARD)
Practical



1	(a)(i)	zero reading included readings for 10 mins temperatures show decrease and B is finally less than A	[3]
	(b)(i)	suitable scale for temperature correct plotting of points smooth curves drawn	[3]
	(iii)	tube A	[1]
	, ,		[-]
	(c)	test-tube A stayed warm for longer; insulation provided by surrounding test-tubes; rate of heat loss by conduction/convection/radiation is less; smaller difference in temperature between tube A and surroundings compared with tube B (and its surroundings).	s 3 max
	(d)	suitable temperature between A and B (1) some insulation/prevention of heat loss provided by tube A and tube either side/less insulation/prevention of heat loss than tube A becauside exposed to air. (1)	
	(e)	lines continued as smooth curves.	[1]
	(f)	any suitable suggestion, e.g. ensure same starting temperatures, e identical volumes	nsure
		To	otal 15
2	(a)	blue colour (not green)	[1]
	(b)(i)	no effervescence or no reaction no carbonate	[2]
	(ii)	white ppt. chloride present	[2]
	(iii)	litmus turns blue ammonia	[2]
	(c)	each test for copper correctly described scores three	[6]
	(d)	ammon <u>ium</u> chloride and copper	[2]
		To	otal 15

Mark Scheme

IGCSE EXAMINATIONS – November 2003

Syllabus

0654

Paper

5

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – November 2003	0654	5

3 (c)(d)	Table	
	Correctly calculating mass of nitrate/100g At least three temperatures recorded	[1] [1]
	Temperatures 70-78 62-70 55-63 50-58	[4]
(e)	correct plotting smooth curve drawn continues curve beyond plotted points	[3]
(f)	correctly read from graph solubility correctly read	[1] [1]
(g)	heating is irregular etc	[1]
(h)	one for each correct answer	[3]

Total 15



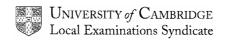
INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 60

SYLLABUS/COMPONENT: 0654/06

CO-ORDINATED SCIENCE
Alternative to Practical



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	6

1. (a) Average values correct as in table. (-1 for each error, 2 errors = 0 marks)

alcohol concn. /%	average heart rate per minute
0	210
1	192
2	174
3	146
4	92
5	46
6	34
7	24
8	18

[2]

(b) suitable scales (1) points plotted correctly (1) smooth curve drawn (1) [3]

(c)(i) (gradual) fall in heart rate (1)
(ii) steeper fall than in (i) (1) [2]

(d) slower reaction/reaction time increased [1]

(e)(i) counting error/variation in individual daphnia/warming effect of light different temperatures/ any other appropriate reason [1]

(ii) longer count time/repeat several times at each alcohol strength/ check temperatures/any other appropriate (any one) [1]

Total 10 marks

2. (a) 25, 3, 44, cm³ [3]

(b)(i) copper or zinc, (no reaction with water) [1]

(ii) iron (1) iron rusts (and reacts with oxygen) (1) [2]

(iii) magnesium or calcium (1) reacts with water (1) [2]

(c) hydrogen [1]

Total 9 marks

3.	(a)	70, 62, 55°C	[3]
	(b)	140 g	[1]
	(c)	points plotted (2) (-1 for each error) smooth curve (not straight line) (1)	[3]
	(d)	40g of potassium nitrate in 100g water at 60°C	[1]
	(e)	heat to evaporate (1) allow to cool (1)	[2]
		Total 10 ma	rks
	(- \ (; \	F-7	
4.	(a)(i) (ii)	57 43	[2]
	(b)	Table with 3 columns correctly headed and 2 rows (or vice versa), (1) data correctly entered (1) (-1 overall if 0 time omitted)	[2]
	(c)	tube A	[1]
	(d)	(yes) (no mark for this) A stayed warm for longer/surrounding tubes acted as insulation/ any reference to mechanism of heat loss/smaller difference in temperature across the wall of tube A compared with tube B	[3]
	(e)	repeat and average/put all tubes in a water bath at first/measure volumes accurately/any sensible suggestion (any 2)	[2]
		Total 10 ma	rks
5.	(a)	test 1 carbon or copper oxide test 3 not a carbonate test 4 chloride (ions) test 5 ammonia	[4]
	(b)	fumes with HC1	[2]
	(c)(i) (ii)	light (1) blue precipitate (1) deep (1) blue solution(1) (any 3 points)	[3]
	(d)	ammonium chloride copper oxide	[2]

Mark Scheme
IGCSE EXAMINATIONS – NOVEMBER 2003

Page 2

Total 11 marks

Syllabus 0654 Paper 6

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – NOVEMBER 2003	0654	6

6. (a	a)(i) (ii)	radio (wave) sound (wave)	[2]
(b	o)	The further away the source, the weaker is the sound OWTTE	[1]
(c	- / (- /	3.0 s 3.8 +/- 0.1s	[2]
(d	(i)(k	1000/3 = 333 m/s	[1]
	(ii)	1000/3.8 = 263 m/s	[1]
(e	e)	The first (1), because the other one may be affected by the responses of the observer (1) OWTTE	[2]
(f)	repeat the experiment and average the results	[1]

Total 10 marks