

GCSE

Science

Session: 2000 June

Type: Mark scheme

Code: 1794

Oxford Cambridge and RSA Examinations



GENERAL CERTIFICATE OF SECONDARY EDUCATION
(former Midland Examining Group syllabus)

GCSE 1794

SCIENCE: DOUBLE AWARD (SYLLABUS A) (CO-ORDINATED)

MARK SCHEME FOR COMPONENTS TAKEN IN JUNE 2000



OCR (Oxford, Cambridge and RSA Examinations) is a unitary awarding body, established by the University of Cambridge Local Examinations Syndicate and the RSA Examinations Board in January 1998. OCR provides a full range of GCSE, A level, GNVQ, Key Skills and other qualifications for schools and colleges in the United Kingdom, including those previously provided by MEG and OCEAC. It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2000

Any enquiries about publications should be addressed to:

Publications OCR Mill Wharf Mill Street BIRMINGHAM B6 4BU

1794

The number of candidates awarded each grade was as follows:

	A*A*	AA	BB	CC	DD	EE	FF	GG
Percentage in Grade	7.6	10.4	12.9	29.0	20.9	10.8	5.3	1.9
Cumulative Percentage in Grade	7.6	18.0	30.9	59.9	80.7	91.5	96.8	98.8

These statistics are correct at the time of going to publication.

The total entry for the examination was 39259

Component Threshold Marks

Component	Max Mark	A	В	С	D	E	F	G
1 Paper 1	90			61	52	43	34	25
2 Paper 2	105	67	57	48	31			
3 Paper 3	90			66	56	47	38	29
4 Paper 4	105	81	70	59	39			
5 Paper 5	90		51 41 32	23	14			
6 Paper 6	105	65	55	45	28			
7 Coursework	63	51	45	39	33	27	21	15

Foundation Tier

	Max Mark	A*	Α	В	С	D	E.	F	G
Overall Threshold Marks	400				257	217	178	139	100
Percentage in Grade					28.2	28.7	21.7	14.1	6.5
Cumulative Percentage in Grade					28.2	56.9	78.6	92.7	99.2

The total entry for the examination was 22105

Higher Tier

	Max Mark	A*	Α	В	С	D	E	F	G
Overall Threshold Marks	400	309	275	241	207	146	115		
Percentage in Grade]	16.1	22.0	27.5	23.5	10.3	0.4		_
Cumulative Percentage in Grade		16.1	38.1	65.6	89.1	99.4	99.8		

The total entry for the examination was 17152



June 2000

Markscheme 1794/1

Science: Double Award Syllabus A (Co-ordinated)

		Evacated Anguage	Mks	Additional Guidance
1	estion	Expected Answers A = reptile	IVIKS	all correct = 4 marks
1		B = mammal		4 correct = 4 marks
		C = bird	l i	3 correct = 2
		D = fish		2 correct = 1
ł		E = amphibian		Z COTTECT = 1
ļ			(4)	
			(-,	
2	a	(cell) membrane;	1	
		cytoplasm;	1	Y
		nucleus;	1	
		·		
	b i	cytoplasm;	1	Owtte
		(cell) membrane;	1	
į		controls (the reactions) inside the cell/contains	1	reject brain / nerve centre
		DNA;		
	ii	respiration;	1	
	С	to absorb water / to take up water / to anchor	1	ALLOW correct reference to
		root in soil / to absorb minerals / nutrients /		absorption
		named nutrient;		IGNORE Surface area reference
	d	24 ÷ 6 ;	1	
		4;	1	
	е	Root (hairs) pulled off / destroyed / left in soil	3	ANY three points
		when pulled up;		
		plant cannot absorb enough water / less		
		water;		
		ref. to turgidity / flaccidity of cells;		
		root (hairs) regrow;	(4.2)	
		plant takes up water (and recovers);	(13)	
3	<u>а</u>	oesophagus;	1	
	u	stomach;	1	
		pancreas;	1	
		small intestine;	1	
	b i	A on small intestine;	1	Some part of letter inside
	ii	D on stomach;	1	Organ
		E on anus;	1	~
	С	Muscles;	1	ANY two points
		Behind food contract/in front of food relax;		ACCEPT 'muscles squeeze/push food
		Peristalsis;	1	along' = 1
				ACCEPT 'muscles squeeze food
				along by peristalsis' = 2
				IGNORE reference to types of
				muscles
			(9)	

Q	ues	tion	Expected Answers	Mks	Additional Guidance
4	a	i	(green) plants;	1	
		ii	caterpillar / grasshopper / greenfly;	1	
		iii	bird / spider / beetle;	1	
	b		food web;	1	
	С	•	(decrease) more eaten by spiders; less grasshoppers for spiders to eat; (increase)		ACCEPT additional valid synlengtion
			more green plants to eat;		ACCEPT additional valid explanations
			less eaten by grasshoppers; (population remains the same)	2	
			more food; more eaten by spiders;	(6)	
5	а	i	20;	1	ACCEPT 19-20
		ii	50; bar correctly drawn;	1	
	b		(more cigarettes), more deaths from lung cancer;		ANY three points numbers increase for both diseases
			(more cigarettes), more deaths from bronchitis; increase greater with lung cancer than bronchitis;	3	= 2 marks
			At 1-14 more die from bronchitis;aw	(6)	
3	а		preserved / mineralised remains of an animal / remains of an animal turned to rock / imprint of animal in the rock;	1	Remains of animal = 0
	b		coal / limestone / sandstone / chalk / marble / shale / mudstone / (any) sedimentary rock;	1	
	С		evidence for evolution / to see how species (AW) have changed over time / to see if Charles Darwin got it right / evidence for early life / what was living years ago /to study extinct animals / plants / to date rocks;	1	
	d	i	dead body got covered by (sand) / bones left (after decay / rots); bones (and sand) turn to rock / due to pressure / squashed;		This is a low-demand question. The candidates will express these ideas in a variety of ways.
		1	rock was uncovered;		ACCEPT any two points about fossils formation for 1 mark each
	e i	· 1	lobe-finned fishes;	1	Reject heating
	i		A and B (need both);	1 (7)	

Qu	est	tion	Expected Answers	Mks	Additional Guidance
7	а		4 or 5 bars correct = 2	2	
			2 or 3 bars correct = 1		
	b	i	body mass, height,	1	ANY 2 for 1 mark
			length of index finger;		
		ii	blood group, sex (gender);	1	BOTH needed
	С	,	(controlled by genes) any one of: blood group, natural eye colour and sex (gender);	1	
			(controlled by genes and modified) body mass and skin colour;	1	
			(caused by the environment) scar;	1 (7)	
8		i	pressure / contact / touch	1	ACCEPT pain
			points of hairpin / hairpin;		
			provide the standard standard		
		ii	Susan calling out (1 or 2 points);	1	ACCEPT '1 or 2'
	b		finger tips;	1	
	C		there are more touch / pressure receptors / sense cells / nerve endings in some parts than others / density of receptors is greater than other parts; sensors different distances from surface; thickness of skin varies; the sense cells in some parts share neurones and so is not possible to distinguish between two or one points; sense receptors may inhibit the functioning of neighbouring receptors in some parts; some parts might have a bigger brain area devoted to them compared to other parts;	2	REJECT 'nerves', 'nerve cells' REJECT ' the skin is more sensitive in some areas than others'
	d		receptor/dendron; synapse; effector;	1 1 1 (8)	

	_	tion		Mks	Additional Guidance
9	а		stomach acid;	1	
			tears;	1	
	b	:	/platalata)	!	
	D	i	(platelets)		ANY three points
			forms clots / scab / mesh / barrier; stops microbes / bacteria entering;		Account
			(white blood cells)		Accept phagocytosis
			engulf / eat / surround microbes /	3	Reject germs Ignore fight / kill bacteria
			bacteria;		ignore light / kill bacteria
			produce antibodies/antitoxins;		
		ii	plasma, transports / carries (dissolved food	1	Blood part and job for 1 mark
			substances / urea / carbon dioxide / enzymes		
			antibodies / cells / blood cells / hormones /		
			proteins / heat);	1	
			red blood cells / haemoglobin, carries oxygen / carbon dioxide;		
			dal bott dioxide,	(7)	
				'''	
10	а	i	carbon dioxide;	1	Ignore energy
			oxygen;	1	Accept carbon dioxide and oxygen
					,,
		ii	photosynthesis;	1	
	b	i	light (energy) / sun;		
	~	•	nght (energy) / sull,	1	Accept solar energy
		ii	chlorophyll;	1	
	С	i	respiration;	1	IGNORE aerobic / anaerobic
					ALLOW glycolysis /
		::	name to the same t		fermentation/oxidation
		ii	starch;		
			for storage / used in respiration / for energy (release);		mark in pairs.
			cellulose;		1 more for the substance of the
			for support / for cell wall;		1 mark for the substance and 1 mark for the use.
			protein / amino acids		for the use.
			for growth / enzymes / repair;		Reject fructose /
			sucrose;		carbohydrates,
			for transport / for sweet fruits / nectar;	4	polysaccharides
			fat / lipids;		
			for cell membrane / storage / cuticle /		Use only = 0
			energy		Name alone = 1 mark
			release; chlorophyll;	Ī	
			for photosynthesis / absorbs light / aw;		
			vitamins;]	
			for enzyme reactions;	İ	
				(10)	

Question	Expected Answers	Mks	Additional Guidance
11 a	pain killer / stops pain/numbs pain;	1	Owtte IGNORE specific examples, eg headaches. ignore references to 'aches'
b	Barbiturate;	1	ignore references to defice
С	feel cannot live without it / need it to work normally / body becomes dependent upon it / addictive / craving;	1	Reject stimulates mind
	withdrawal symptoms / specific example of symptoms / euphoric effects if taken;	1	neject stimulates minu
		(4)	
12 a i	before = 15 after = 33 change = 18;	1 1	ecf
iİ	Multiply 2 factors (1) 20 x 18 x 4.2 (1) 1512 (J) (1)	3	ecf Correct answer with no working = 3 Correct equation only = 1
b	Stirrer; more even heating / owtte; air enclosed; heat cannot escape; oxygen (rather than air to burn biscuit); more complete / effective / better burning; crumbled biscuit; increased surface area; copper(coil); better heat conductor; coil; larger surface area;	4 (9)	ACCEPT bell jar/lid Comparative statement needed Explanation must match feature
		Total 90	



Markscheme 1794/2 June 2000

Science: Double Award Syllabus A (Co-ordinated)

Q	uestion	Expected Answers	Mks	Additional Guidance
1	a	Oesophagus/(i);	1	Lines must end on structure
		Pancreas/(ii);	1	Accept word written on diagram
		large intestine/(iii);	1	Each correctly labelled
	b	Muscles;		ANY two points
		Behind food contract / in front of food relax:		ACCEPT 'muscles squeeze/push
		Peristalsis;	2	food along' = 1
		,	-	ACCEPT 'muscles squeeze food
				along by peristalsis' = 2
				Ignore reference to types of
				muscle.
	С	Bile emulsifies fats / breaks large drops of	1	masolo.
	Ū	fats into small droplets / aw to increase	' .	
		surface area of fats (for enzymes to work		
		on);	1 .	
		Bile is alkaline / neutralises acid / to give the		
		optimum pH for enzymes / raises pH;	(7)	
		opullium ph for enzymes / faises ph;	(7)	
2	a	Pain killer / stops pain / numbs pain;	1	Owtte
_	_	rain kindi / Ocopo pain / Harriso paini,		Ignore specific examples e.g.
				headaches
				Ignore references to aches
	b	Barbiturate;	1	ignore references to defies
	C	Feel cannot live without it / need it to work		
	•	normally / body becomes dependent /		
		addictive / craving;	2	
		Withdrawal symptoms / specific examples of	-	Reject stimulates mind
		symptoms / euphoric effects if taken;		nojost stimatos illina
		o, mpromo , capito, io anion,	(4)	
3	a i		-	ANY three points
		(platelets)		
		forms clots / scabs / mesh / plug /		Accept phagocytosis
		barrier;		Ignore fight/kill bacteria
		stops microbes / bacteria entering;	_	Reject reference to germs
		(white blood cells)	3	
		engulf / eat / surround		
		microbes / bacteria;		
		produce antibodies / antitoxins;		
	ii		1	Blood part and job for 1 mark
		plasma, transports / carries (dissolved food		
		substances / urea / carbon dioxide /		
		hormones / enzymes / antibodies / cells /		
		proteins / heat);	1	
		red blood cells / haemoglobin, carries oxygen		
	_	/ carbon dioxide;	:	
	b	Acid destroys microbes;	i	
		Acid produced/found in stomach;		

Oi	uestion	Expected Answers	Mks	Additional Cuidous
4	a	18 °C temperature;	1	Additional Guidance Correct answer = 3 marks
'	•	20 x 18 x 4.2; ecf for temperature rise	1	
		1512 (J); ecf for temperature rise	1	Correct equation = 1 mark
		1012 (5), ect for temperature rise	'	
	b	stirrer; more even heating/owtte;		Feature with correct explanation
		air enclosed; heat cannot escape;		
		oxygen (rather than air to burn biscuit); more	4	Accept bell jar/lid
		complete/effective/better burning;		Comparative statement needed
		crumbled biscuit; increased surface area;		
}		copper (coil); better heat conductor;		
		coil; larger surface area;		
			(7)	
5	a	to absorb water/to take up water/ to anchor	1	Allow correct reference to
		root in soil/ to absorb minerals/nutrients/		absorption
		named nutrient;		Ignore reference to surface area
	b	24/6 = 4	1	
	С	root (hairs) pulled off/destroyed/ left in soil		ANY three points
		when pulled up;		
		plant cannot absorb enough/less water;	3	
		ref. to turgidity/flaccidity of cells;		
		root (hairs) regrow;		
		plant takes up water (and recovers);		
	d	correctly labelled guard cell;	1	Lines must end on structure.
	_	if labelling		Allow line only
		ideaming		Allow line only
	е	wilted plant did not lose water (vapour)/did	1	
		not transpire/ recovered plant lost water	'	
		(vapour);	1	
		recovered plant stomata were open/ wilted	·	
		plant stomata closed;		
	f	guard cells take in water/become turgid;	1	Reject wrong shape
		due to uneven thickness of cell walls;	1	,
		guard cells change their shape;		
			(10)	

Q	uest	ion	Expected Answers	Mks	Additional Guidance
6	а		there are more touch / pressure receptors /		Any two points
			sense cells (in some parts than others) /		
			nerve endings /		Reject nerve / nerve cell
			density of receptors is greater than other		
			parts;		Reject ' the skin is more sensitive
			sensors different distances from surface;		in some areas than others'
			thickness of skin varies;	2	
			the sense cells in some parts share neurones		
			and so is not possible to distinguish between		
			two or one points;		
			sense receptors may inhibit the functioning of		
			neighbouring receptors in some parts;		
			some parts might have a bigger brain area		
			devoted to them compared to other parts;		
	b		receptor / or named receptor / nerve ending;		Reject messages / signals
			transduces / changes energy;		Reject electricity
			into nerve impulses / electrical energy or	1	
			impulses;		
	_		rogentori	4	
	С		receptor;	1	
			synapse; effector;	1	
			chector,	'	
	d		Long, to cover distance;		ACCEPT any 2 structural
	_		Thin, take up little space / diffusion of ions;		comments without explanations
			fatty / myelin sheath, insulation;		= 1
			fatty sheath, speeds up transmission of	2	
			impulses;		Ignore synapse reference
			many endings, to increase surface area /		
			sensitivity / more connections / dendrites /		
			dendrons;		Ignore Axons
				(10)	
					/
7	а	1	ВВВ		
			DD	1	Parent gametes = 1
			BB	1 1	
			b	ı	
			b b		ticks in vertical line on RHS.
			Bb Bb		ticks in vertical line on 1113.
			DD DD		
			bb		
		ii	bb x bb	1	ACCEPT bb
		-		•	
	b		X ray / uv / nuclear / ionising radiation /	1	Any one point
			analine / ninhydrin / phenol/dioxin / pcb's /		-
			radioactive substances / mustard gas / tar		Ignore radiation
			(from cigarettes) /		Accept increased temperature
			benzene (from petrol) / strong magnetic field;		
				(4)	

Question		stior	Expected Answers Mks		
3	a		(decrease)	Mks	Additional Guidance
			more eaten by spiders;		Any two points
			less grassbanners for and it		Accept additional valid
			less grasshoppers for spiders to eat;		explanations.
			(increase)	2	
			more green plants to eat;	4	
			less eaten by grasshoppers;		
			(population remains the same)		
			more food;		
			more eaten by spiders;	1	
	b	i	a step / level / stage / position / place in a	1 1	
			food chain or web;	'	Any one point
			feeding level;		
			level in pyramid of numbers / biomass /		
			energy;		
		ii			
		11	Bird;	1	
	С	i	20 / 1000 x 100;	1	
			= 2%;	1	2 = two marks
		ii	(named) Carbohydana / /		
		"	(named) Carbohydrates / (named) proteins / (named) fats / ATP/DNA/RNA;	1	Accept any organic containing
			(named) rats / ATP/DNA/RNA;		carbon that is passed along the
					food chain
		iii	Respiration;		
			as heat energy / light / sound;		Ignore CO ₂
			movement / muscular contraction;	2	
			excretion / carbon dioxide / urine / urea /		Allow oxidation
			sweating;		
			inedible parts;		
			death/decay;	4	
			egestion/faeces;	(9)	

Q	Question		Expected Answers	Mks	Additional Guidance
9	а		$6CO_2 + 6H_2O - C_6H_{12}O_6 + 6O_2$	2	Symbols = 1 mark
					Balancing = 1 mark
	b	i	respiration;	1	Ignore anaerobic / aerobic
					Allow glycolysis /
					fermentation / oxidation
		ii	starch;		Adouble a prime
			for storage / used in respiration / for energy		Mark in pairs.
			(release);		1 mark for the substance and 1
			cellulose;		mark for the use.
			for support / for cell wall;	4	mark to, the abo.
			protein/amino acids;		Reject fructose / carbohydrates /
			for growth / repair / enzymes;		polysaccharides
			sucrose;		
			for transport / nectar;		Use only = 0
			fats / lipids;		Name only = 1
			for cell membrane / storage / cuticle /		
			energy		
			release; chlorophyli;		
			for photosynthesis/absorbs light/aw;		
			vitamins;		
			for enzyme reactions;		
	С		Temperature / availability of water / acid rain	1	Reject humidity
			/ (named) minerals in soil;		Reject heat
	d	l	A;	1	
	,	ii	E;	1	
		11	No increase in rate unless carbon dioxide	1	
			concentration is increased / levels constant	!	
			unless carbon dioxide concentration		
			increases;		
İ					
	е		Red/blue - high rate / photosynthesis occurs;		ANY three points
			Green – low rate / no photosynthesis;	_	
			Green light reflected / not absorbed;	3	
			Red or blue light absorbed;		
				(14)	
				(· - / /	

	Question		Expected Answers	Mks	Additional Guidance
10	а	i	It / predator / animal that kills and eats	1	
			another animal / prey;		
		ii	streamlined body, for speed through water;	İ	ACCEPT any 2 features with
			large / sharp claws, to holding / catch fish;		correct explanations.
			sharp teeth, to tear / catch at fish;	2	
ľ			eyes at front of head, for binocular / good		
			vision / good judgement of distance of prey;		ACCEPT any 2 unexplained
			big / webbed feet, for swimming;		features for 1 (max)
			tail qualified, for swimming / steering;		
			fur qualified, for movement qualified;		
	b		Pesticides are poisonous substances;		ANY three points
			Pesticides kill otter food/pesticides taken in	İ	Accept otters less fertile/ less
			by fish/plants;		reproduction/ fewer young;
			Passed through chain/web;		
			Concentration of pesticides increases as		
			passes through food chain/web/concentration		
			builds up in otter body;	3	
,	С		mink compete for same homes/ holes/habitat	1	ALLOW mink kill or drive
			(in river bank);		out/aggressive to otter = 1
			mink compete for (same) food;	1	
					Accept mink pass disease to
				(8)	otters
11	a	ţ	all correct = 2 marks;	2	
			6 or 7 correct = 1 mark;		
		ii	amazah auman		
		11	smooth curve;	1	
		iii	volume of sweat increases and volume of	1	
		111	urine decreases;	1	
			volume of urine decreases at a steady rate.	1	
			volume of urine decreases at a steady rate, volume of sweat at a changing rate;	'	
			volume of sweat at a changing rate,		
	b		as the amount of sweat increases (cooling),		LOR marking
	U		more water is leaving the body, water level		LOR marking
			of (blood) drops therefore less urine = 2;	5	
			or throod, drops therefore less utilie – 2,	5	
			Correct ref. to brain senses that water level		
			in blood lower, more ADH produced, ADH		Accept converse ergument
			causes kidney to remove more water from		Accept converse argument
			urine and reabsorbed into the blood, therefore		ļ
			less and more concentrated urine is formed.		
			The area of the serious action to the serious		
					,

Question	Expected Answers	Mks	Additional Guidance	
12 a i	capable of dividing to form lots of	1		
	cells/plants;	1		
	all (genetic) information available for			
	complete development of complete plant (in			
	one cell);			
ii	to obtain disease free plants/ no	1		
	contamination;			
	·			
iii	sucrose - source of energy/respiration/for	1		
	manufacture of cellulose;			
	amino acids – for protein	1	Reject controls growth on its own	
	production/enzymes;	1		
	auxins - promote/stimulate/encourage (root)			
	growth/ development/elongation of cells;			
b	fast;		ANY four points	
	little space needed/done on a large scale;			
	disease free;		Reject cheaper	
ļ	good qualities maintained;			
	genetically identical/clone;			
	offers more control over production;			
	high yields/many plants from one cell;			
	no competition;	4		
		(10)		
13 a	greater rate of respiration with increasing	1		
	activity;			
	carbon dioxide is a (waste) product of	1		
	respiration;			
	· · · · · · · · · · · · · · · · · · ·			
1	Increasing earlier diavide concentration		ANY three points	
D D	Increasing carbon dioxide concentration		Alt three points	
	lowers pH; Lower pH/Increasing carbon dioxide			
	concentration in blood detected/stimulated;	3		
	by medulla/ brain;			
	increased rate of nerve impulses;			
	to intercostal muscles/ diaphragm;			
	to intercostal massios, diapinagin,			
		(5)		
		Total		
		= 105		



Markscheme 1794/3 June 2000

Science : Double Award Syllabus A (Co-ordinated)

Question	Expected Answers	Mks	Additional Guidance
1 a	Thermometer;	1	ACCEPT recognisable spellings
	Condenser;	1	
	salty water;	1	
	pure water;	1	
b	add / mix / put in / put together / place / the	1	
	Universal Indicator with the water;	1	
	turns / goes / be / green;		
	· ——	(6)	
2	aircraft fuel;	1	DEDUCT 1 mark for every item
	propane gas;	1	in excess of three
	road tar;	1	
		(3)	
3	Tick	1	DEDUCT 1 mark for every tick in
	-		excess of three
	-		
	tick	1	
1	-		
	tick	1	
		(3)	

Q	Question		Expected Answers	Mks	Additional Guidance
4	а	i	copper;	1	
		ii	Magnesium;	1	
		iii	Magnesium Iron Copper	1	must have all three in correct order
	b	i	copper;	1	
		ii	copper sulphate;	1	
	С		Carry out the reaction (owtte) / use a thermometer; Detect a temperature increase;	1	'temp change' = 0 REJECT any mention of heating
:	d	i	copper and iron;	1	must have both
		ii	(no mark for name of metal) iron – cars / bridges / drain covers / radiators etc; It is strong / cheap; copper - water pipes / water tanks / wire / coins; it does not react with water / it can be shaped / it is a good conductor / it does not corrode; magnesium – alloy wheels / flares / fuse in thermit; it has a low density / burns easily;	1	ALLOW any uses for steel ALLOW reference to uses as catalysts(1) because they are transition metals ALLOW uses of copper alloys. REJECT 'copper does not rust'
	е		blue colour fades; àred-brown solid / coating on zinc / zinc changes colour / zinc is copper coated/copper colour appears;	1 1 (12)	REJECT any mention of bubbles or unqualified equations

	Question		Expected Answers	Mks	Additional Guidance
5	a	i	3.5%;	1	Unit required
	u	•	<u> </u>	•	One rodanoa
		ii	There is too much CO;	1	
	b		toxic / poisonous / complexes with blood	1	REJECT 'dangerous',
			(owtte) / prevents oxygen uptake / colourless		unbreathable', 'chokes',
			/ odourless / kills;		'suffocates'
	_		learban diavida routa ta angueri	3	ABIV three points
	С		(carbon dioxide route to answer) name: greenhouse effect(owtte); (1)	3	ANY three points REJECT refs to 'acid
			causing: traps heat; (1)		rain'/'ozone'
			result: earth warms up/global warming; ((1)		Rising sea level/causes pollution
			effect: more hurricanes (owtte) / warmer /		= neutral
			drier / colder/change in rain patterns/		
			more winds/floods; (1)		
			(Smog route to answer)		'Smoke' = neutral
			smog/fog; (1)		
			water droplets(suspended) in the air; (1)		ACCEPT refs to 'solid particles in
			reduces sunlight/temperature changes/blocks		the air'
			light/reduces visibility;(1)	(0)	
				(6)	
6	а		melts (very easily) / low melting point;		ANY two points
	-		catches fire (easily);	2	, , , , , , , , , , , , , , , , , , ,
			(too) flexible / bends easily;		No others allowed
			·		
	þ		easy to make PVC coloured (ora);	1	Mark first two answers only
			difficult for PVC to catch fire (ora);	1	ACCEPT 'PVC does not catch
	_		does not bond enaily / oan be coloured:	1	fire' No others allowed
	С		does not bend easily / can be coloured;	,	
	d		Washing up bowls / food wrapping / cling	1	ACCEPT any sensible answer
			film /		
			buckets / bags / children's toys / washing up		
			gloves;	(6)	
<u> </u>					
7	а	i	Electrons;	1	
			Neutrons and protons;	1	DE IECT (see we!
	b	ii :	Nucleus / nuclei; 1;	1 1	REJECT 'core"
	D	i	2 / II;	1	
	С	"	H or He;	1	REJECT names
	d		use a small amount (of Li/Na/K);		ANY three points
			do not touch / use tongs / wear gloves;		•
			wear safety spectacles;		'wear aprons /coats' / 'protect
			use a safety screen / fume cupboard /		the bench' / 'keep metal under
			venting;		oil' / 'don't breathe in fumes' /
			dispose of final solution carefully;		'stand far away' are all
			keep top on jars of metals;	3	NEUTRAL
			use a large water surface / large container;		
			bucket of sand in room / fire extinguisher; put any bits back (under oil) or (into ethanol);	(9)	
			put any bits back (under on) or (into ethanol);	(8)	
<u> </u>					<u></u>

Q	Question		Expected Answers	Mks	Additional Guidance
8	а	i	В;	1	
		ii	A;	1	
		iii	D;	1	
			-		
	b		$2H_2O_2 \longrightarrow 2H_2O + O_2$	1	ACCEPT multiples
					·
<u></u>				(4)	•
9	а		a gas / carbon dioxide is given off / escapes /	1	'Hydrogen given off' = 0
	•		lost		'Marble chips dissolve' = 0
			(as the reaction takes place);	_	'Gas/CO ₂ formed = 0
	b	1	correct plotting of points;	2	error + or - one square
		::	correct curve (set from what).	1.4	-1 for each mistake, minimum 0
		ii iii	correct curve (ecf from plot);	à1	ACCEPT a reasonable attempt
		111	2 grams lost between 0 and 2 minutes;	1	a comparison of the slope scores = 2
			1 gram lost between 2 and 4 minutes	1	"it loses more mass in the first 2
1			(therefore faster between 0 and 2 mins.);		mins" = 2
1			1		'the slope is steeper at the
					start' = 2
					'it is steep in the first 2
1					mins ' = 1
					'It is steep at first' = 1
					'Greater/bigger_drop at
			<u> </u>		start' = 2
					'Big drop at start' = 1
	С		line starts at 190g and is below the first one;	1	
			giving same mass loss/ finishes at 186g;	1	
				(0)	
1				(8)	
10			sodium chloride/ salt;	1	REJECT sodium chlorine
'	_		Codiani chilohach carry	•	nest obtain one inc
			sulphur dioxide/ sulphur (IV) oxide;	1	REJECT sulphur oxide
					•
	b		giant structures have high (mpts);	1	"molecular structures have low <u>er</u>
			molecular structures have low (mpts) / melt	1	melting points than giant
			easily;		structures"
_					= 2 marks
	С		bonds;	1	
			2.0.0	4	A COEPT O C C C C
	d		2.8.8;	1	ACCEPT 2 8 8 or 2-8-8
			2.8;	1	ACCEPT correct diags
	е		40 + 16;	1	AWARD 1 mark for
	6		= 56;	1	20 + 8 = 28 or 28
			55,	•	IGNORE units
	f		Both are in the same group(owtte) / they	3	Look for comparison somewhere
	•		have the same outer electrons;	-	in the answer
			Strontium has 2 outer electrons / strontium is		
			in Group 2;		
			Strontium loses 2 electrons / forms an ion		REJECT 'electrons shared'
			Sr ²⁺ ;	(12)	
L					

Question	Expected Answers	Mks	Additional Guidance
11 a	D C A B	111110	Additional Galdange
	D somewhere before C; C somewhere before A; A somewhere before B;	1 1 1	
b	Melting / liquefying; Crystallisation / solidifying / freezing;	 1 1	ACCEPT either order 'heat' = 0 'cooling'/'cools' = 0
С	high temperature / hot; high pressure / lot of pressure / extreme pressure / intense pressure;	1	not heat. ACCEPT 'higher' If values are quoted on their own: min = 100 atm Min = 1000 °C
d	no yes yes no	(9)	four correct = 2 marks 2 or 3 correct = 1 mark
12 a	reversible;	1	
b i	air;	1	
ii	crude oil;	1	
c i	BADEC		
	A somewhere before D; D somewhere before E; E somewhere before C;	1 1 1	
c ii	eutrophication;	1	
		(7)	
13 a	nitrogen;	1	ACCEPT symbols / formulae
b	oxygen;	1	throughout.
С	carbon dioxide;	1	
đ	carbon dioxide;	1	
е	argon:	1	
		(5)	
		Total = 90	



Markscheme 1794/4 June 2000

Science : Double Award Syllabus A (Co-ordinated)

Question		ion	Expected Answers	Mks	Additional Guidance
1	а	i	Electrons;	1	कार कार का का नगर का जार र जा जा
			Neutrons and protons;	1	
		ii	Nucleus / nuclei;	1	REJECT 'core'
l	b	i	1;	1	
		ii	2/ 耳;	1	
	С		H or He;	1	REJECT names
	d		use a small amount (of Li/Na/K);		ANY three points
			do not touch / use tongs / wear gloves;		'wear aprons / coats' /
İ			wear safety spectacles;		'protect the bench' /
•			use a safety screen / fume cupboard / venting;		'keep metal under oil' /
			dispose of final solution carefully;		'don't breathe in fumes'
			keep top on jars of metals;	3	/ 'stand far away' are all
			use a large water surface / large container;		NEUTRAL
			bucket of sand in room / fire extinguisher;		
			put any bits back (under oil) or (or into ethanol);		
	е		NaOH;	1	Allow 1 mark for an
					incorrect balanced e.g.
			$2Na + 2H_2O> 2NaOH + H_2$	1	2Na + H ₂ O>
					Na ₂ O + H ₂
	f		Reactivity increases down group or converse;		ANY four points
			atoms larger down group / outer electron further		ACCEPT two correct
		l	away;		electron arrangements
			on reaction atoms each lose one electron;	4	as an alternative to the
			electrons more easily lost down group;		second point.
		Ī	force of attraction between nucleus and outer		
			electron reduced;	(15)	
2			giant structures have high (mpts);	1	"molecular structures
_	-		molecular structures have low (mpts) / melt easily;	1	have lower melting
			more subjective that of the terminal of the subjective that the su	•	points than giant
					structures"
					gains 2 marks
	b		2.8.8;	1	Accept 2 8 8 or 2-8-8
			2.8;	i	Accept correct diags
				.	oup t oon out diago
	C		40 + 16;	1	AWARD 1 mark for
			=56;	i	20+8= 28
					28 + 1
					IGNORE units
	d	1	Both in the same group (owtte) / they have the		Look for comparison
			same outer electrons;	į	somewhere in the
		1			answer
			Strontium has two outer electrons/strontium is in	1	
			Group 2;	}	
			Strontium loses two electrons / forms an ion Sr 2+;	1	Reject 'electrons shared'
				(0)	
			•	(9)	
				<u>_</u> <u>_</u>	

Q	uest	tion	Expected Answers	Mks	Additional Guidance
3	а	i	В;	1	
		ji	A;	1	
		iii	D;	1	
	b		$2H_2O_2 \longrightarrow 2H_2O + O_2$	1	ACCEPT multiples
				(4)	
4	а		D C A B D somewhere before C; C somewhere before A; A somewhere before B;	1 1 1	
	b		Melting/liquefying; Crystallisation / solidifying / freezing;	1	ACCEPT either order 'heat' = 0 'cooling / cools' = 0
	С		High temperature / hot; High pressure / a lot of pressure / extreme pressure/intense pressure;	1	not heat ACCEPT 'higher' If values quoted on their own: min = 100 atm, min = 1000°C
	d		no yes; yes no;	2	four correct = 2 marks 2 or 3 correct = 1 mark
	е		Crystallising of magma; Where either crystallises (intrusive inside the earth, extrusive at surface or close to surface of earth);	1 1 (11)	REJECT 'cooling' Ignore crystal size

Question	Expected Answers	Mks	Additional Guidance
5 а	a gas / carbon dioxide is given off/escapes/lost (as the reaction takes place);	1	'hydrogen given off' = 0 'marble chips dissolve' = 0
b i	Correct plotting of points;;	2	$'gas/CO_2$ formed' = 0 error + or - one square
			-1 for each mistake, minimum 0
ii	Correct curve (ecf from plot);	1	ACCEPT a reasonable attempt
iii	2 grams lost between 0 and 2 minutes;	1	a comparison of the slope scores = 2
	1 gram lost between 2 and 4 minutes (therefore faster between 0 and 2 mins.);	1	"it loses more mass in the first 2 mins" = 2 'the slope is steeper at the start' = 2 'It is steep in the first
			two minutes' = 1 'It is steep at first' = 1 'greater/bigger drop at start' = 2 'big drop at start' = 1
			big drop at start = 7
С	line starts at 190g and is below the first one; giving same mass loss/ finishes at 186g;	1	
d	Reaction slower/takes longer;	1	
	<u>particles</u> further apart; fewer (effective) collisions;	1 1 	
		(11)	
6 a i	BADEC		
	A somewhere before D; D somewhere before E;	1	
	E somewhere before C;	1	
ii	Eutrophication;	1	
b i	nitrogen N_2 ammonia NH_3 hydrogen H_2	2	Three correct labels = 2 marks Two correct labels = 1
ii	Iron/Fe/iron oxide;	1	
iii	Nitric acid;	1	Nitrate acid = 0
		(8)	
			<u> </u>

Q	uest	ion	Expected Answers	Mks	Additional Guidance
7	а		Alkalines;	1	
	b		In plentiful / excess air; Carbon dioxide; in limited air; carbon monoxide / carbon / soot;	1 1 1 1	2 marks for products 2 marks for a distinction in the amount of air Any reference to incorrect product e.g. hydrogen, ethene loses 1 mark
	С	i	Cracking / thermal decomposition;	1	ACCEPT 'decomposition' REJECT 'Endothermic / Exothermic'
		ji	4C ₂ H ₄ ; H ₂ ;	1	
		iii	Red / brown / red-brown / orange / yellow; Colourless;	1	REJECT 'clear' / discoloured ACCEPT 'decolourised' / paler
	d	į			
			H H	1	Indication of long
				2	molecule = 1, single bond between carbon atoms = 1
:		ii	Does not tear / waterproof / airtight / no trees cut down / easy to produce a film / transparent / does not rot;	1	Does not rot cannot be credited twice
			Does not rot away / uses up oil supplies;	1	
				(15)	
8	а		earthquakes at plate boundaries; most;	1	
	b		Any line through two or more points starting and finishing on a drawn plate boundary;	1	
	С		Plates moving past each other/rubbing together/friction between plates;	1	
	d		Any two relevant points;;	2	REJECT answers relating to materials or buildings
				(6)	

	stion	Expected Answers	Mks	Additional Guidance
9 а		8.8 (g) hydrogen; no. of moles $P = 91.2/31 = 2.94$ no. of moles of $H = 8.8$; Formula PH_3 ;	1 1 1	Answer only = 1
b		34;	1	
С		H •× H * P * •× H	2 (6)	IGNORE shape 3 covalent bonds = 1 marks two non-bonded electrons = 1 mark
0 a		Copper toxic / metals expensive / save ores / pollutant /can be sold;	1	Dangerous = 0
b	i	Filtration / decanting;	1	Accept displacement
	ii	They have <u>larger</u> surface area;	1	reaction
		64 / 56; Mass of copper = 1.1(4) (tonnes);	1	
			(5)	

Q	Question		Expected Answers	Mks	Additional Guidance
11	а		Fluorine,	1	BOTH required
			F;		Correct symbol
	b	i	Solid;	1	
		ii	236 -320 (°C) ;	1	(Actual value = 302°C)
			Differences 94 to 121 to 150+;	1	ACCEPT any supporting explanation
		iii	Very dark grey/black;	1	
		iv	Sodium astatide;	1	
			NaAt;	1	Symbol must be correct
	С	i	(line 1) (x) (x) (√) (line 2 (x) √ √ (line 3) x x (x)	3	Four correct = 3; Three correct = 2, Two correct = 1
		ji	Displacement;	1	
		iii	2KI + Br ₂ > I ₂ + 2KBr	2	Products = 1
	d		Sodium hydroxide - Making soap, degreasing, cleansing drains, paint stripping, oven cleaner, absorbing acid gases, making paper; Sodium hydrogencarbonate - Raising agent, indigestion tablets, baking powder, toothpaste, fire extinguishers; Sodium carbonate - Washing soda, making glass, neutralising acids, softening water, soap powder;	(15)	ANY two points
				Total = 105	



June 2000

Markscheme 1794/5

Science : Double Award Syllabus A (Co-ordinated)

Q	uesi	tion	Expected Answers	Mks	Additional Guidance
1	а		cell;	1	
			Moon;	1	
	b	i	Continuous straight line from bird to eye	1	
			through periscope;		
			suitable reflection(s) at mirror;	1	
			arrow(s) on ray(s);	1	
		ii	Right way up;	1	
			same size;	1	
			virtual;	1	
	С		Transverse waves are up and down/crests and	1	Reject description of diagram
			troughs / at right angles to the direction;		
			Longitudinal waves travel along the wave /	1	
, i			rarefactions and compressions / backwards		
			and forwards / vibrates in same direction as		
			wave;		
				(10)	
2		:	Company plane field line in a series of		
4	а	i	C arrow along field line in correct direction;	1	
			D arrow along field line in correct direction;	1	
		ii	both like poles;	1	
			labelled N;	1	
			Tabelled IV,	1	
	b	i	idea of electromagnet/iron magnetised by	1	Emphasis on electromagnet
		-	current;		REJECT 'current through iron'
			attracts iron bar;	1	Reject iron becomes magnetic
					Reject attract hammer
					riojose dell'ase marrinor
		ii	ANY two points from:		
			circuit breaks / current stops;	2	
			iron demagnetised / electromagnet stops		i
			working;		
		ľ	spring pulls back;		
	C		EITHER point:		
			iron permanently attracted;	1	
			no control by current;		
		1		ĺ	
		ii		2	ALLOW 'soft iron'
		- 1	more coils;		
			bigger battery / voltage / current / more cells;	ĺ	
			bigger core;		
			weaker spring;	,	
				(11)	
				ļ	

Q	uest	ion	Expected Answers	Mks	Additional Guidance
3	а		ANY four from:		
			gamma-rays;		
			X-rays;		
			infra-red;	4	
			microwaves;		
			radio;		
	b		infra-red/ultra -violet;	1	
	~		ultra -violet;	1	
			gamma -rays/X-rays;	1	
			infra-red;	1	
				'	
	С	i	Light;	1	ACCEPT infra-red
		ii	Any THREE from:		
			internal reflection (stated or shown);	3	
			$\angle i = \angle r$ or quality of diagram;		eg label \angle i = \angle r, otherwise by
			angle > critical angle OR 42 °;		eye
			total internal reflection;		
				(12)	
4	a		Energy;	1	
	b	i	Earth;	1	
	-	ii	Earth;	1	ALLOW green and yellow/green
		iii	trip/break circuit (breaker)/fuse blows;	1	REJECT 'break', 'blows up'
					'explodes' 'blows'
l	С		higher current;	1	ACCEPT 'higher power'
			less heating /less resistance/melts thin	1	REJECT 'more electricity', 'faster
		,	wire/prevents fire;		current', 'stronger current'
					Ref to "it" implies thicker wire.
	d	i	0.1, 0.2, 0.7, 0.5	2	All correct = 2
					2 or 3 correct = 1
		ii	fan heater;	1	ECF (from energy column)
		iii	2.5;	1	ECF
			15131(.0);	1	ECF
				(11)	
				-	

	<u>lues</u> 1	tion	Expected Answers	Mks	Additional Cuidana
5	а		travels as a wave;	1	Additional Guidance
			several cm lead;		
	b	i	Increases;		
	~		,	1	
		ii	decreases;	1	
		iii	ANY two points from:	2	1
			Idea of fair test;	-	
			Correct variation on γ count with thickness;	1	ì
			Logical effect;	1	
			I .		
		iv	alpha stopped by glass/short ranged;]1	
		V	safety;	1	REJECT rof to (domestic, # 144
			elaboration – e.g. does not affect body tissue;	1	REJECT ref. to 'damaging liquid'.
			i sala sala not uncer body tissue;	` ['	Safety may be implied.
				(9)	
 3			Hubble teles		
,	đ		Hubble telescope;	1	
			Mir Space Station;	1	
			Moon;	1	
	b	İ	Any two from:		Reware repetition if
			less distance to travel/orbit path shorter;	2	Beware repetition if vague e.g.
			larger speed;	2	smaller orbit
		ŀ	lower orbit/less distance from Earth;		
		- 1	more gravity;		
		- 1			
	ς.		Gravity;	1	Accept centripetal
	ď	}	speed = distance ÷ time;	[1	,
		ŀ	90 000 ÷ 0.3;	1	
		1	300 000;	1	
					7
				(9)	
_		_		10,	
	a		radiation;	1	
			convection;		
	b	- 1		1	
	U		(cooling by) evaporation;	1	
			Any TWO of :	[
			energy to evaporate comes from body;	2	
		r	nolecules/particles carry energy/heat;	[NOT just forms access to
		(conduction takes energy/heat to body surface;		NOT just 'carry sweat away'
		+	he high energy particles escape;		Give CREDIT for 'energy needed to
		4 L			PV2DOrato' or rot to latent burn
			eaving body at a lower temperature.	! !	evaporate' or ref to latent heat
,		10	eaving body at a lower temperature;		
(J.	eaving body at a lower temperature; ANY two approaches from:		ALLOW IR
(11 2 1	eaving body at a lower temperature; ANY two approaches from: educes radiation;		
C		11 2 1	eaving body at a lower temperature; ANY two approaches from:		
(r s	eaving body at a lower temperature; ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects;	4	ALLOW IR
(eaving body at a lower temperature; ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects; educes convection;	4	ALLOW IR For each point there must be a
(eaving body at a lower temperature; ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects; educes convection;	4	ALLOW IR For each point there must be a reduces process followed by a
ſ	2	ri v	eaving body at a lower temperature; ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects;	4	ALLOW IR For each point there must be a
(ri v	eaving body at a lower temperature; ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air	4	ALLOW IR For each point there must be a reduces process followed by a
(2	r v n	eaving body at a lower temperature; ANY two approaches from: educes radiation; chiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement;	4	ALLOW IR For each point there must be a reduces process followed by a
(2	r v n	ANY two approaches from: educes radiation; thiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement; educes evaporation;	4	ALLOW IR For each point there must be a reduces process followed by a
(r v n	eaving body at a lower temperature; ANY two approaches from: educes radiation; chiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement;	4	ALLOW IR For each point there must be a reduces process followed by a
(r v n	ANY two approaches from: educes radiation; chiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement; educes evaporation; ensible process;	4	ALLOW IR For each point there must be a reduces process followed by a
ť		res res	ANY two approaches from: educes radiation; chiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement; educes evaporation; ensible process; educes conduction;	4	ALLOW IR For each point there must be a reduces process followed by a
(res res	ANY two approaches from: educes radiation; chiny surfaces radiate less/reflects; educes convection; varm air kept near skin/prevents wind/air novement; educes evaporation; ensible process;	4	ALLOW IR For each point there must be a reduces process followed by a

Question		ion	Expected Answers	Mks	Additional Guidance
8	a		ANY one point from: more leverage; force further away from pivot; more force on spring; idea of force needed at E less than force at M;	1	REJECT 'more force' REJECT 'not strong enough'
	b	i	62, 70, 85, 94, 107	2	All correct = 2 3 or 4 correct = 1
		ii	4/5 points plotted correctly;	1	Within ½ small square
		iii	straight line through origin;	1	Look for at least two points above and below line
		iv	line across (between 64-66mm) and down; correct answer from candidate's graph;	1	
	С		80 x 90 OR 12 x F; 80x90 = 12 x F OR F=7200÷12 OR F = 80 x 90÷12;	1	Look for moment. Use of Principle of moments.
			600;	1	Answer.
				(10)	
9	а		switch; variable resistor; diode;	1 1 1	
	b	i	Any resistive component from list;	1	
		ii	reduce value/lower value/remove resistor/increases current;	1	ACCEPT 2 marks for combined (i) and (ii) answer involving other components
	С		ANY three points from: Current in motor; Current in red lamp/passes through X; No current in green lamp because Y is a one way device/Y wrong way round;	3	If only green lamp referred to then no current and reference to diode scores 2
	d		red lamp off AND green lamp on;	1	
				(9)	
·· <u>·</u>				Total = 90	





Question	Expected Answers	Mks	Additional Guidance
2 a	ANY one point: more leverage; force further away from pivot; more force on spring; idea of force needed at E less than force at M;	1	REJECT 'more force' REJECT 'not strong enough'
þ	equation implied; substitution (1500 ÷ 3000); answer (0.5); unit (m/s²);	1 1 1 1	ALLOW N/Kg
c i	4 / 5 points plotted correctly;	1	Within ½ small square
ii	straight line through origin;	1	Look for at least two points above and below line
iii	line across (between 64-66mm) and down; correct answer from candidate's graph;	1	
d	80 x 90 OR 12 x F; 80x90 = 12 x F OR F = 7200÷12 OR F = 80 x 90÷12; 600;	1 1 (12)	Look for moment. Use of Principle of moments. Answer.
3 a	electrons; idea of backwards and forwards;	1	ACCEPT 'vibrate / oscillate'
b	higher current; less heating / less resistance/melts thin wire / prevents fire;	1	ACCEPT 'higher power' REJECT 'more electricity', 'faster current', 'stronger current'
c i	0.1, 0.2, 0.7, 0.5	2	Ref. to 'It' implies thicker wire All correct = 2
ii	fan heater ;		2 or 3 correct = 1 ECF (from energy column)
	2.5; 15131(.0);		ECF ECF
		(9)	

Science: Double Award Syllabus A (Co-ordinated)

Question	Expected Answers	Mks	Additional Guidance
1 a	radiation; all others need a medium / molecules / particles OR only radiation can travel through a vacuum;	1	ORA. ALLOW 'in space'
b	(cooling by) evaporation;	1	
	Any TWO of: energy to evaporate comes from body; molecules / particles carry energy / heat; conduction takes energy / heat to body surface; the high energy particles escape; leaving body at a lower temperature;	2	NOT just 'carry sweat away' Give CREDIT for 'energy needed to evaporate' or ref. to latent heat
С	ANY two approaches from: reduces radiation; shiny surfaces radiate less / reflects; reduces convection; warm air kept near skin / prevents wind / air movement; reduces evaporation; sensible process; reduces conduction; ref. to trapped air / correct ref. to plastic material;	(9)	For each point there must be a reduces process followed by a because reason

Q	uest	ion	Expected Answers	Mks	Additional Guidance
4	а		Any THREE from: internal reflection (stated or shown); ∠ i = ∠ r or quality of diagram; angle > critical angle OR 42 °; total internal reflection;	3	e.g. label \angle i = \angle r, otherwise by eye
	b	i	light in / illuminate object; reflected light / image / signal from body out;	1	
		ii	so that image is not 'jumbled up';	1	
		iii	ANY one point from : no need for / smaller incisions; shorter / less complicated operations / avoids operations;	1 (7)	
5	а		ANY one answer from: use a more powerful transmitter; focus / direct signal more accurately; amplify signal en route / on reception; use a larger dish;	1	ACCEPT 'shorter wavelength' if qualified
	b	i	T at origin of waves;	1	
		ii	R where reflected beams cross;	1	
		iii	correct beam on LHS of diagram; correct beam on RHS of diagram;	1	
		iv	focus implied; consistent wavelength (3 waves); correct curvature, centred on R;	1 1 1	
	С		shorter wavelength; less diffraction;	1	ALLOW 'higher frequency'
				(10)	

Question		on		Mks	Additional Guidance
6	а	i	idea of electromagnet / iron magnetised by	1	emphasis on electromagnet
			current;		REJECT 'current through iron'
			attracts iron bar;	1	Reject iron becomes magnetic
					Reject attract hammer
		ii	ANY two points from:	2	
		"	circuit breaks / current stops;	_	
			iron demagnetised / electromagnet stops		
			working;		
			spring pulls back;		
	b	i	EITHER point:	1	
			iron permanently attracted;		
			no control by current;		
		::	ABIV torre mainte frame.	2	ALLOW 'soft iron'
		11	ANY two points from: more coils;	2	ALLOW SOIL HON
			bigger battery / voltage / current / more cells;		
			bigger core;		
			weaker spring;		
			1 3,		
	С	i	Forces in opposite directions;	1	
			ANY two points from:	2	A COEPT was a f FILLID
			force down on AB OR force up on CD;		ACCEPT use of FLHR
			current in a field so gets a force; field of wire acts against field of magnet;		
			force is perpendicular to current / field;		
			10100 to perpendicular to defront / field/		
		ii	spins other way;	1	ALLOW 'poles on coil reverse'
			current/forces reverse;	1	
		iii	idea of contacts reverse / current reverses'	1	
		·	when coil passes vertical / every half turn;	_	
			so forces reverse OR show opposite vertical	1	
			forces;	(14)	·
				(1-7)	

	uest	ion	Expected Answers	Miks	A delition of Outstand
7	a		motor spins faster;	1	Additional Guidance
′	u		red lamp brighter;	1	
			green lamp off;	<u>'</u>	
				'	
	b	i	line across and down;	1	
			5 - 6 (mA);	1	
		ii	equation implied;	1	R = V/I or $V = IR$
i					
			substitution (1.6 ÷ 0.005) (ecf from graph);	1	OR 1.6 ÷ 5
			answer (320) (ecf from graph);	1	OR 0.32
			unit (ohms);	1	OR KΩ
		:::	atorta ware high / infinite.	_	
		111	starts very high / infinite; decreases;	1	
			decreases,	1	
		iv	voltage across red LED = voltage across	1	
			green LED;		
			current through red LED is 25 mA from	1	ORA
			graph;		
			no current through green LED OR current	1	
!			through motor = current through red LED;		
				11.4	
				(14)	
8	а	i	charge must flow through rod;	1	ALLOW 'current'
			electrons move down;	1	
		ii	left hand side of the ball;	1	
	h	i	ione:	,	
	b	'	+ to dome, - to ball (BOTH required);	1	
			r to dome, - to bail (botti required),	1	
		ii	equation implied (energy/charge);	1	OR consistent conversions
			substitution (90 ÷ 0.001);	1	21. 22.10.000112 00.11010110
			answer (90 000);	1	
				(8)	
	,				

Question		ion	Expected Answers	Mks	Additional Guidance
9	а	1	ANY two points from:	2	- Additional Galdanos
			Idea of fair test;		
			Correct variation on y count with thickness;		
			Logical effect;		
		ii	alpha stopped by glass / short ranged;	1	
		iii		1	REJECT ref. to 'damaging liquid'.
			elaboration - e.g. does not affect body	1	Safety may be implied.
			tissue;		
	b	i	time taken for count rate or activity to halve	1	or atoms / particles
			to halve/ number of nuclei decaying to		
			halve;		
		ii	correct activity after 5, 10 years;	1	
			correct activity after 15, 20 years;	1	
			smooth curve through points;	1	At least four points
		,			
		111	line across, not going down more than 5	1	
			squares		Do not worry about the label
		IV	activity reduces too quickly / half life too	1	
			short;		
			not anough gounts / norticles to the l	1	
			not enough counts / particles to check bottles / requires calibration / changed		
			frequently;	(42)	
			inequently,	(12)	
10	а	-	equation implied (distance / speed);	1	
			substitution (600 / 300 000);	1	
			answer = 0.002 ;	1	
	b	i	infra-red has longer wavelength / short		
			frequency;	1	
		ĺ			
		ii	visible does not get through dust / too much	1	
			dust;		
	С		gravity pulls them together;	1	
		.	at a second		
	d	\	dimmer / lower temperature;	1	
		ii l	(nuclear) fusion / hydrones		
		"	(nuclear) fusion / hydrogen converting into helium;	1	
	е			4	
	G		it is much more massive than Jupiter;	1	
	f		it is much further from the star than the	1	Overtine the distance of the control of
	1		Earth from the Sun (owtte);	1	Quoting the distance is sufficient
				(10)	
				(10)	
				Total =	
				10tal = 1	
				100	