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Biology

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Code: 1325

MEG

MIDLAND EXAMINING GROUP

GCSE EXAMINATIONS SUMMER 1994

MARKING SCHEME

for

SCIENCE: BIOLOGY 1325 PAPER 2

Notes:

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Biology Paper 2 (1325/2)
Summer 1994

SECTION A (Maximum 60 marks)

Question Number				Mark
1	(a) (b)	- cell wall - no nucleus/single strand DNA/single chromosome/ - DNA loop - single celled/non cellular/acellular/microscopic	) **Reject**) spores) asex. reprod.) binary fission) micro-organisms	
	(c) (d)	- fungi/named eg mould/caenocytic - no chlorophyll/spores/cell walls/not photosynthetic saprophytic and parasitic/related to eg sapro or paras/ reference to spore cases etc.	**R** Yeast **R** Microscopic	
	(e) (f)	- scales - gills - fins/swim - cold blooded - lay eggs - **R** live in water	) Any chordate) feature true) for group.)))	
	(g) (h)	- feathers - warm blooded - beak - internal fertilisation - wings/fly - lay eggs - parental care	)))))	
	(i) (j)	- hair/fur - warm blooded - vivipary/s.a. w. - internal fertilisation - parental care - external ears - mammary glands/suckling young/produce milk.	))))	1 x 10
				Sub Total 10

Question Number			Mark
2	(a) (i)	A	1
	(ii)	1 & 2 cell wall/regular shape/rigid shape - vacuole/cell sap - chloroplasts/chlorophyll/starch grains	2
	(iii)	A palisade/mesophyll/cortical **R** Leaf B neurone/nerve/motor **R** Sensory	2
	(b)	- boiling water - in warm alcohol - safety - water/rinse - add iodine - blue/blue-black/purple indicates starch/look for colour change	5
		(Not necessarily in this order if process holds together)	**Sub Total 10**
3	(a) (i)	ball and socket/synovial/universal **R** Shoulder **R** Ball joint **R** Socket joint	1
	(ii)	B humerus D radius	2
	(iii)	tendon	1
	(iv)	hinge/one plane only/up **and** down/bent & straightened **R** Two directions.	1
	(b)	- nerve impulse/message - muscle contraction (any reference) (Look for this mark)/shortens and/or thickens - biceps contracts to bend arm/s.a.w. - triceps contracts to straighten arm. - antagonistic action/biceps contracts & triceps relaxes/vice versa	5
			Sub Total 10
4		Answer may be 1 comparative statement worth 2 marks or 2 statements each worth - 1 mark	
	(a)	organic, cheaper	2
	(b)	inorganic, easier to spread/description of techniques	2
	(c)	organic, longer/slow release of nutrients **R** works slower/faster	2
	(d)	organic, improved/does not harm soil	1
		inorganic, damages soil/does not improve soil	1
	(e)	organic, not likely/no risk/very little risk;	1
		inorganic, leaching/run-off possibly/leads to entrophication	1
			Sub Total 10

Question Number			Mark
5	(a) (i)	Asex: one, Sex: two	1
	(ii)	Asex: identical/none/same as parents) Both statements **R** Asex = less Sex: not identical/different from parents) required **R** Sex = more	1
	(b)	Advantage Asex: maintains good strain exactly/character same/ no variation/survive same environment as parents **R** quicker Sex: produces new varieties/ produces variation/not genetically identical permits evolution/improves survival chance of species Disadvantage Asex: no resistance to disease/change/pass on poor characteristics no variation/easier transmission of disease. Sex: cannot breed to give identical off-spring/variation **R** genetic disorders transmitted.	4
	(c)	- plant puts out stems/stalks/shoot/branch/runner **ALONG GROUND**/contacts ground **R** stolon - new plant grows/puts down roots - parent plant supports new plant - connections broken/new plant independent - (labelled/annotated diagram OK as alternative approach)	4
			Sub Total 10
6	(a) (i)	only one of each type allowed (- climate adapted **A** specific examples (- longer shelf life eg faster racehorses (- disease resistant (- high yield/faster growth (- attractive appearance/better taste/quality (- genetically engineered organisms eg SCP	3
	(ii)	- select desired character (one mark - breed from that type of parent (max. for select for same characteristic in offspring, repeat (technique	2
	(b)	- organisms over produce - variety within offspring/not all the same/mutation - competition **R** any obvious allusion to species - some adaptations/varieties ensure survival/=survival of fittest - survivors breed - genes passed on - happens over many generations/very long time.	5
			Sub Total 10
			TOTAL SECTION A 60

SECTION B (Maximum 60 marks)

Question Number			Mark
7	(a)	8400	1
	(b)	1000	1
	(c)	18900 - 10500 = 8400 (1 for working 1 for correct answer) **kJ** essential	2
	(d) (i)	- Food 1 - Highest/more energy per 100g	2
	(ii)	- 18900 ÷ 38 - 497.37g/497.4/497/500**g** essential (Value for Food 2 = 14538.46) Food 3 = 1800.00) Treat these similarly Food 4 = 4725.00)	2
	(e)	- Heat released = (20 x18 x 4.2) divided by 2 = 756 units not needed but if used must be J NOT kJ	2
			Sub Total 10
8	(a)	1 mark for each correct link with arrow to next trophic level. No arrows/wrong direction **-1** once only (-1) each additional link NOT suggested by prose of question	4
	(b)	- DDT passed along food chain/description of food chain - concentration increases/builds up in body - because cannot be excreted/remain active for a long time - may reach lethal dose/kills - or may reduce breeding capacity/affects egg production - population decline/s.a.w. - reduced food availability (less insects etc)	4
			Sub Total 8
9		Exact transference of labels - capillary of umbilical artery brings wastes to the placenta) - urea and carbon dioxide passed/diffused) - to mother's blood in **blood space**) - capillary to vein carries blood away from uterine lining) - capillary from artery brings blood to lining of uterus) - food and oxygen passed/diffused) - from mother's blood in **blood space**) - capillary of umbilical vein takes food/nutrients and) - oxygen away from the placenta) ORDER can vary and be correct	6
			Sub Total 6

Question Number			Mark
10 (a)(i)	-	3 correct plots (Style of answer: Boxes required as shown for carbon dioxide.)	3
(ii)	-	methane - nitrous oxide - carbon dioxide Any two from three	2
(iii)	1	- electricity generation 'burns' fossil fuel - less conventional energy/fuel 'burnt' - lowers carbon dioxide release. **R** Pollution	2
	2	- maintaining temperature uses energy/fuel - insulation reduces fuel use - less carbon dioxide produced	2
	3	- plants absorb carbon dioxide - more trees will reduce atmospheric (carbon dioxide)	2
alternative 2		- insulation maintains temperature - less CFC's for air conditioning	
(b) (i)	-	70 ppm (units - essential)	1
(ii)	-	population increase/industrial expansion - increase in destruction of forests - **greater** consumption of fuels/any named use	2
			Sub Total 14
11 (a)	-	AB **R** A	1
(b)	-	BC **R** C **R** Times	1
(c)	-	Range 07.12 to 07.30/Just before 7.30 (Ignore am/pm) - photosynthesis uses carbon dioxide - less carbon dioxide released from 07.30/more carbon dioxide used from 07.30 - photosynthesis requires light **R** Photosynthesis has started	4
(d)	-	10.30 Ignore am/pm - carbon dioxide release equals carbon dioxide uptake/no carbon dioxide exchange	2
(e)	-	1	1
(f)	-	4 - release from <u>respiration</u> = 2 - uptake = 2	3
			Sub Total 12

Question Number			
12 (a) (i)	-	urea - salts (mark 1st two and deduct 1 mark for 3 or more answers)	2
(ii)	-	glucose - amino acids (as for 12(a)(i))	2
(iii)	-	do not pass into kidney tubule/too large/protein never filtered/stays in blood stream	1
(b) (i)	-	13	1
(ii)	-	23 - 8	2
(iii)	-	Rat B - water from food exceeds loss (or suitable alternative wording)	2
		R B Losing less than A	

Sub Total 10

TOTAL SECTION B 60

TOTAL 120

The Award of Marks for Spelling, Punctuation and Grammar

Marks are awarded according to the following criteria:

Level		Marks
	Candidates who fail to achieve the threshold performance criteria.	0
Threshold performance	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	1-2
Intermediate performance	Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	3-4
High performance	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	5-6

The marks will be awarded on an impression basis and will reflect the candidate's performance in the paper as a whole.

MEG

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GCSE EXAMINATIONS SUMMER 1994

MARKING SCHEME

for

BIOLOGY PAPER 3 (1325/3)

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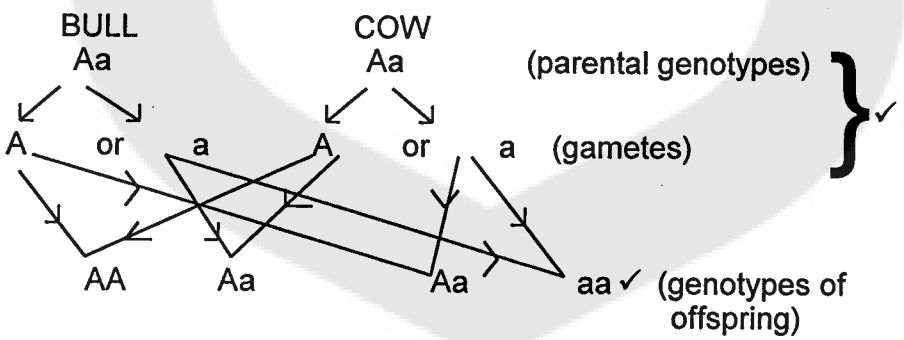
Biology Paper 3 (1325/3)
Summer 1994

SECTION A

Question Number		Mark
1 (a)	220 - 210 = 10 g	1
(b)	100 - 88 = 12cm^3 ; 12 cm^3 is the equivalent of 12 g. cm^3 must be mentioned.	2
(c)	**Four of :** Loss of water by **transpiration**; capillarity leaf walls related to water loss; causes water to be withdrawn from cells of leaf; causes osmotic/suction effect pulling water from xylem; adhesion/cohesion; suction causes column of water in xylem to be pulled up/expressed in terms of transpiration stream, therefore transpiration will influence uptake by roots. If mention a mechanism then 1 mark. Max 3 if start at wrong end	4
(d)	Some water is used in photosynthesis (making food)/ metabolic activity/increase the turgidity of cells/support plant	1
(e)	Transpiration rate would vary from day to day; because of external conditions eg wind/bright sunlight/dry atmosphere. **R** weather/weather conditions ie must be specific condition.	2
(f)	Loss of turgor (by cells) of plant; leading to wilting/lack of support. ignore plasmolysis **R** withered	2
	Sub-Total	**12**

Question Number			Mark
2 (a)	(i)	Methane and carbon dioxide.	1
	(ii)	5	1
	(iii)	**Four of:** Gas is produced in **slurry vessel** (under anaerobic conditions); **water jacket** helping to keep vessel airtight; gas produced causes **gas collector** to float upwards/gas collector stores the gases; gas enters pipe through **valve**/valve prevents backflow of gas; **gas outlet pipe** transports gas; **stirrer** helping (microbes and dung) to mix thoroughly; **tap** is opened to deliver biogas.	4
(b)	(i)	Reference to **microorganisms/enzymes** having greater activity with rise in temperature/or opposite statement. **R** works best/optimum	1
	(ii)	Otherwise aerobic respiration would occur/anaerobic wouldn't; no methane would result/different reaction would occur	2
	(iii)	eg **Two of:** substances in dung poisonous to microorganisms; water content of dung; type of dung (eg higher cellulose content); reference to pH; number of microorganisms present **R** impurities in digester, moisture, temperature, O_2 **R** "concentration of dung" **R** "unwanted bacteria in slurry vessel"	2
(c)		e.g. cuts down on use of natural resources eg trees/coal/ oil; less need to make artificial fertilisers which need energy to produce them. Any well argued case = 2	2
		Sub-Total	**13**

Question Number			Mark
3 (a)	(i)	Shows carbohydrate starvation and high carbohydrate diet; correct axes; points plotted correctly; points joined with straight lines and no extrapolation of line. wrong way round = 2 max	4
	(ii)	4 **g/kg.** must take it from graph can be ECF	1
	(iii)	Glycogen converted to glucose; to replenish that used during exercise/ref cycling/muscle action. **R** "energy".	2
	(iv)	Glucose is the end product of carbohydrate digestion and is **absorbed** into the blood.	1
	(v)	**Three of:** insulin; produced in response to high levels of glucose in the blood; from pancreas/islet cells/β cells; makes liver/muscle cells more able to absorb glucose/glucose converted to glycogen/glucose stored in glycogen in liver.	
(b)	(i)		2
	(ii)	$^1/_3$rd; reference to aa not surviving so only AA from AA, Aa, Aa.	2
			Sub-Total 15
			TOTAL MARK FOR SECTION A 40

Question Number			Mark
SECTION B			
4	**(a)**	**Nine of:** cardiac/heart **muscle**; **atria** receive blood/AW; **ventricles** despatch blood from the heart/AW; one way circulation achieved by tricuspid valve between right atrium and right ventricle; and bicuspid valve between left atrium and ventricle; systole/**contraction** of atrial (walls) forces blood into ventricles; A/V valve OK if specify **R** and **L** contraction of ventricular (walls) to 'push' blood out; to **lungs** and to **body**; reference to thicker/more muscular wall of left ventricle (resulting in higher pressure to pump blood further); reference to aortic/semilunar/watchpocket valves preventing backflow; reference to pacemaker/S.A.node; during 'resting' of heart blood flows (atria/ventricles relax together and blood flows from vena cava via atria to ventricles); mention of interventricular septum.	Max 9
	(b) (i)	Blocking of branch of coronary artery by thrombus clot; leading to **death**/malfunction of part of **heart muscle** due to lack of **oxygen** or nutrients.	2
	(ii)	***eg** reference to animal fat in diet/cholesterol; * arteriosclerosis/hardening of arteries/artherosclerosis/plaque ***or** obesity caused by incorrect diet; strain on heart.	2
		***eg** Effect of nicotine on heart muscle (post synaptic membrane) * raises BP/leads to increase in fatty substances in blood. ***or** reference to carbon monoxide increase in blood; * interferes with oxygen carrying capacity of blood/carboyxhaemoglobin, * Any valid answer will be credited.	2 4
	(c)	**Five of:** Absorption by **diffusion**/active transport; via capillaries/villi; portal vein; **capillaries** in liver; hepatic vein; vena cava; (mention of artery or wrong organ stop marking)	5
			Sub-Total 20

Question Number **Mark**

5 (a) **Nine of:**

Clay soil	Loam soil
clay has smaller particles	reasonable mix
small air spaces	larger air space
tendency to water logging	less chance of waterlogging
tendency to denitrification	no dentrification
poor root respiration	good root respiration
poor nitrification	good nitrification
coldness of clay	warms up quickly
capillarity	reasonable capillarity
water availability is less	better water availability
clay sticks together	good humus content;
clay dries out on surface	good crumb structure;
	will support good population of animals eg earthworms

MAXIMUM OF 5 MARKS IF CLAY STATED TO HAVE MAINLY LARGE PARTICLES.

(b)

Decomposition		Nitrogen fixation
nitrococcus putrefying/nitrifying bacteria nitrosomonas/decomposing bacteria/both involve bacteria/ nitrobacter or fungi	v	rhizobium bacteria/ nitrogen fixing bacteria/ azotobacter
work on proteins/ ammonium compounds/nitrites/dead (organic matter)	v	use nitrogen gas/atmospheric nitrogen/ nitrogen in air;
free-living bacteria	v	some free-living/some symbiotic;
		mention of root nodules;
products are nitrogenous compounds eg nitrates must be related to above		products are also nitrogenous compounds/nitrates must be related to above

Max 5

Question Number **Mark**

(c) **NO MARK FOR POLLUTANT**

Example	Effect on population (i)	Lessening of effect (ii)
one of:	✓✓ FROM	✓
sulphur dioxide	kills fish/organisms; in lakes/streams; kills trees/lichens; effect on photosynthesis/ forests affected	scrubbers/liming lakes/filters
oxides of nitrogen	kills fish/organisms; in lakes/streams; kills trees/lichens	catalytic converters
carbon monoxide	effect on animal population and qualification	catalytic converters
lead	effect on animal population/lowers intelligence	lead-free petrol
soot CO_2; CFC	prevents light on leaves; less photosynthesis	reduction in use of fossil fuels
one of:	✓✓(½ mark depending on quality of answer)	✓
oil slick	eg effect on bird or crustacean population	spray with detergent/oil booms
nitrates	eutrophication and effect on eg fish	use more organic fertiliser
sewage	eutrophication and effect on eg fish	proper effluent treatment
heavy metals	effect on animals	effluent purification
radioactive substances	effect on all aquatic organisms	laws preventing discharge into waterways.
nitrogenous fertilisers; pesticides;		

6

Sub-Total 20

Question Number			Mark
6	(a)	Crustacea; insect(a); myriapod(a); arachnid(a); = 4 **Any six characteristics of:** Two pairs antennae (crustacea); four pairs legs (arachnida); two main body sections (arachnida); appendages on all segments (myriapoda); three body regions (insecta); six legs (insecta); (two pairs) wings (insecta). Idea of branching key /contrasting characteristics; logical layout (1, 2, 3 . . . 'go to' etc); does it work. **ANY NINE . .** MAXIMUM OF FOUR MARKS IF NO ATTEMPT TO CONSTRUCT A KEY (FOUR MARKS FOR NAMES OF CLASSES)	9
	(b) (i)	Seed would not be made; because pollination would not be possible (receptive surfaces removed); therefore no subsequent fertilisation.	3
	(ii)	**Three of:** seed will develop; because of cross pollination; leading to fertilisation and ovule development; no self pollination possible because of removal of stamens.	3
	(c)	eg Two **batches** of plants/flowers of same species; isolate variable size/number of leaves/numbers; remove stigmas/styles/stamens immediately flower opens or before; leave second batch intact; leave a week; examine plants/flowers for signs of swollen ovaries/seeds.	5
			Sub-Total 20

Question Number			Mark
7 (a)		**Nine of:** at dawn photosynthesis starts to occur/light increases from dawn; light intensity greatest around mid-day; high rate of photosynthesis; faster than respiration; increasing oxygen production/oxygen levels; temperature also increases during day; effect on respiration (and photosynthesis); reference to animal respiration; photosynthesis declines with reduced light intensity; **max 5 if haven't the idea that plants respire as well as photosynthesise;** rise in carbon dioxide levels; drop in temperature with darkness; reference to fluctuation in rate of photosynthesis in daylight as a result of temporary cloud cover etc; compensation point	Max 9
(b)	(i)	Absence of light would have no effect on germination/reference to some seeds which need exposure to light to germinate; seedling plant would be long, weak/long internodes; small leaves/etiolated; no chlorophyll/yellow/unable to photosynthesise.	4
	(ii)	**Two of:** no effect on seed; seedling/seed/plant/shoot/leaves would grow in direction of light; reference to differential amounts of auxin; bringing about greater growth on shaded side.	2
(c)		eg Equal number of seeds on damp cotton wool/soil/compost in container; **Two of:** equal amount of water; equal spacing; equal temperature (1 mark for reference to "fair test") batch 1 in light (batch 2 in total darkness); check for germination after a few days - then again after 2 weeks periodically. **or** Seeds/seedling on damp sawdust/any medium in container; in box with hole cut in one end; box painted black inside; an equal batch of seeds in conditions with all-round light; leave several days. lose one mark if example is potted plant reference to "fair test"/ 1 variable to be isolated.	5
			Sub-Total 20
			TOTAL MARK FOR SECTION B = 40

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		Marks
Below Threshold Performance		**0**
Threshold performance	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	**1**
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High performance	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	**4**

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