

Environmental and Land-based Science

GCSE J650

Mark Schemes for the Units

June 2008

J650/MS/R/08

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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.

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B491/01 Plant Cultivation, Foundation tier

Question		Max Mark
1	cool and dry	1
2	compost; 20°C	2
3	dominant	2
4	P	1
5	water; light / water / warmth; warmth.	3
6	P touching an anther; F touching an ovule.	2
7	FYM / garden compost / organic fertiliser / lime / humus	1
8	any two from: aerate the soil / breaks soil up; improve drainage; remove weeds; mixing soil	2
9	remove stones; level the soil; produce a good tilth	1
10	any two from: Smaller flower; green / not brightly coloured; feathery stigma; stigma hanging outside the flower; anthers outside the flower	2

Question		Max Mark
11	large quantities of pollen are produced; pollen is light; pollen is carried in the air / more likely to enter the nasal passages	2
12	two from: rot; no / lack of air / oxygen; too cold; seeds washed away	2
13	1,4,6,8,9,12	1
14	soil was waterlogged / no air / oxygen for roots	1
15	in case of anomalous results; in case of disease; to get more reliable results; to allow averages to be calculated. R to make it a fair test	1
16	genetically different; plants received different amounts of water / light/warmth / not a fair test; disease	1
17	0.20kg 0.26kg	2
18	two from: new / lateral buds grow from base of mature bulbs; growth of new bulb / sugars transported from leaves; separation of new bulb over time	2
19	one from: more fruit / flowers; no dead / brown spots on leaves; longer joints / nodes; potato haulms not bronze.	1
20	advantages: quicker; more economical; larger areas cultivated; less labour intensive disadvantages: Soil compaction / plough pan; expensive to buy/run; pollution; areas missed	2

Question		Max Mark
21	crop sold as organic/for more money; cheaper; readily available; releases nutrients slowly; contains micronutrients; improves crumb structure; is not leached as easily; increased water holding capacity / improved drainage R environmentally friendly	3
22	reference to the glass or falling off ladder. use an extendable pole / use jet wash; R any reference to use of ladder or step ladder	2

B491/02 Plant Cultivation, Higher tier

Question		Max Mark
1	P touching an anther; F touching an ovule.	[2]
2	use a dry environment and apply fungicide	[1]
3	Cotyledon; Plumule and Radicle.	[2]
4	P	[1]
5	white	[1]
6	remove all old grain before adding new grain; keep the container in a dry environment.	[2]
7	any 2 from: humidity; light; temperature; pH; moisture	[2]
8	N / nitrate / ammonium; needed for leaf growth/ to make chlorophyll for photosynthesis; more photosynthesis so more sugars for growth.	[2]
9	improves drainage / aids water retention / prevents soil erosion/increases fertility / improves aeration. max 2	[2]

Question		Max Mark
10	two from: new / lateral buds grow from base of mature bulbs; growth of new bulb / sugars transported from leaves; separation of new bulb over time	2
11	more fruit / flowers; no dead / brown spots on leaves; longer joints / nodes; potato haulms not bronze.	1
12	soil was waterlogged / no air / oxygen for roots	1
13	in case of anomalous results; in case of disease; to get more reliable results; to allow averages to be calculated. R to make it a fair test	1
14	genetically different; germinated at different times plants received different amounts of water / light / warmth / not a fair test; disease	1
15	0.2kg C	2
16	1 mark table correct; 1 mark ratio correct: 3:1	1
17	decreases: no credit homozygous recessive decreases / dies / eliminated; proportion of r allele decreases; homozygous dominant increases; proportion of R allele increases.	2
18	prevents fungal diseases / damping off; plants are not growing; plants are not losing much water by transpiration	1

Question		Max Mark
19	pollen containing the new gene transferred from the GM maize; fertilisation of non GM crop with pollen; new maize seeds now contain new gene. max 2	2
20	damage from fork – care where left / care when moving them / wear protective footwear pathogens in soil – wash hands thoroughly after use poisonous chemicals / weedkiller – wear protective clothing / masks / wash hands / careful disposal / qualification	2
21	breaks open the testa / seed coat; allows oxygen to enter; allows water to enter; allows plumule / radicle / seedling to emerge	2
22	idea of cross-breeding two genetically different old varieties to produce new variety; mutation; idea of asexual reproduction produces genetically identical offspring for sale.	2

B492/01 Amenity Horticulture, Foundation tier

Question		Max Mark
1	Winter pansy	1
2	free from pests, diseases and weeds	1
3	<p>B, C, A (given) D, E</p> <p>4(+1) in correct places 3 marks</p> <p>3 (+1) in correct places 2 marks</p> <p>2(+1) in correct places 2 marks</p> <p>1(+1) in correct places 1 mark</p>	3
4	using the hedge trimmer in the rain	1
5	<p>earlier flowering</p> <p>Improved flower quality</p> <p><i>(one mark for each)</i></p>	2
6	<p>evergreen: (one from) colour all year / interest all year / less leaves to sweep up / lower maintenance;</p> <p>perennial: (one from): will last for a long time / does not need planting each year;</p> <p>A: clear references to definition even if not overtly a benefit.</p>	2
7	<p>mix seed with fine (dry, silver) sand before sowing / use pelleted seed / seed pre-sown onto paper tape (any one answer)</p> <p>R: use a tape measure</p>	1
8	<p>any 3 from:</p> <p>water regularly; feeding; remove faded flowers (deadhead); check for pests and diseases</p> <p>R: references to moving plants into sun and other non-routine tasks</p>	3

Question		Max Mark
9	steep slope: hover , petrol fine lawn: cylinder, mains electricity grass verge: wheeled rotary, petrol <i>(BOTH NEEDED FOR EACH SITUATION FOR ONE MARK)</i>	3
10	any two from: make sure student bends correctly/awareness of others working in the area,/Trip hazards / does not over-load wheelbarrow. A: injury to feet R: PPE unless qualified with a hazard	2
11	<i>(one mark for each)</i> thinning: removal or discarding some seedlings (to prevent over-crowding / disease) pricking out: the movement of seedlings from the sowing tray into individual pots or spaced trays (to allow more efficient growth). <i>R: references to merely potting on or transplanting.</i>	2
12	2 of the following shelter from wind; to reduce heat loss maximise light level; site away from shade / , buildings / trees / avoid north facing situations. responses must link to the concepts of extending the growing season	2
13	dirty tools may rust soil may hide damage to the tool clean tools are easier to use. A; concept of spread of soil-born diseases R: concept of soil-born pests (any one response)	1
14	spray with a fungicide / pesticide / chemical (both the plant and it neighbours) remove the infected plant or destroy R: pick off affected berries or parts (any one response)	1

Question		Max Mark
15	any two from: plant dries out very quickly roots are protruding from the bottom / plant is potbound / roots protruding from top. plant falls over easily / top heavy . plant looks sick / nutrient deficiency / smaller leaves	2
16	3 items from: mulching / weeding / pruning / dead-heading / feeding / taking cuttings / transplanting / planting R: watering and other routine jobs not specific to autumn.	3
17	good light transmission long life reasonable cost <i>(2 from)</i>	2
18	reduced heat loss through roof lower risk of breakage <i>(one from)</i>	1
19	light transmission: 78% heat loss: low Expected life :medium any two correct: 1 mark all three correct: 2 marks	2
20	made from natural sources / something that was living / made from plants or animals or their waste R: : the 'chemistry' definition "contains carbon" or concepts related to organic fertilisers being chemical free	1

B492/02 Amenity Horticulture, Higher tier

Question		Max Mark
1	steep slope: hover , petrol fine lawn: cylinder, mains electricity grass verge: wheeled rotary, petrol <i>(BOTH NEEDED FOR EACH SITUATION FOR ONE MARK)</i>	3
2	keep paths clear high wear gloves 1 mark each	3
3	incorrect assembly : medium medium receive training / test before use damage to glass / cuts : medium low clear working space heavy lifting: medium medium get assistance from others. A: other sensible hazards for the situation, marker to carry out own assessment of responses. (no mark for hazard, one mark each for rest of table)	3
4	2 from shortage of water in the soil; ultimate size of the shrub; non-poisonous or prickly plants A: suitability of plant to pH6.5 R: competition with bulbs	2
5	advantage: cheaper / easier to store / allows rain through disadvantage: likely to blow away / harder to apply in windy weather / shorter life <i>one mark for advantage, one for disadvantage</i>	2
6	reduced income- crop would not be ready for Christmas A	1
7	thermal screens / blackout curtains applied over the crop area (1 mark) R: cover the glasshouse R: turn off the lights reduced heating costs due to better insulation / less fuel use R: concepts of better quality (1 mark)	2

Question		Max Mark
8	removing growing tips encourages the plant to branch (produce side shoots) A: improves shape	1
9	keep moist / position in light / keep out of draughts / do not expose to cold temperatures or frosts (any 3 items) R: concepts of planting out as houseplant	3
10	transportation costs are high – uses a lot of fossil fuels Coir is better used for soil improvement in ‘home’ countries to improve yields (theoretical) risk of pathogens such as salmonella (any one of the above)	1
11	seed raised plants will not be ‘true to <i>D</i>	1
12	(a) supermarkets: not their core product / high stockturn required so range reduced / Impulse sales (1 mark) Garden Centres any two from: specialist retailer so holds a broad range / less pressure on sales per sq m./ broader range a potential advantage over the supermarket. (2 marks)	3
13	reduces weed growth D	1
14	good light transmission long life reasonable cost (2 from)	2
15	reduced heat loss through roof/ lower risk of breakage means less maintenance	1
16	light transmission: 78% heat loss: low expected life :medium (any 2 for 1 mark, all three for 2 marks)	2

Question		Max Mark
17	3 items from: mulching / weeding / pruning / dead-heading / feeding / taking cuttings / transplanting / planting R: watering and other routine jobs not specific to autumn.	3
18	thinning out will prevent excessive competition / reduce the risk of disease (damping off, <i>Pythium</i>) / help plants to grow more quickly (2 from)	2

B493/01 Management of the Natural Environment, Foundation tier

Question		Max Mark	
1		N hen house / pig house / cattle shed / tractor shed S hen / pig / cattle house	2
2		D	1
3		EN / RBST / RSPB / WWF;	1
4		A	1
5		de-ionised (distilled) water; barium sulfate;	2
6		C	1
7		C	1
8		D	1
9		enables task to be completed more quickly / faster; ie. ref to time R less pollution / energy used	1
10		hooked beak / broad wings / good vision / sharp claws / sharp beak / streamlined; need feature qualified to get mark	1
11		genetically modified / changed genes / food made from GM crops or animals;	1
12		cross contaminate / pollinate with wild species; encourage less use of pesticides so (less pollution) pollution needs qualifying.; create monocultures; any visual pollution;	1
13		chemically eg. acid rain / dissolved CO ₂ to acid / physically eg. freeze thaw / extreme temperature change / water, wave action qualified ie. pounding ,beating, flowing R rain on own	2
14	1	farmer - fence in / do not graze / control rabbits and foxes / cut tree down;	1

Question		Max Mark	
14	2	park authority - limit access / prevent walking on wall / draw attention to vulnerability of the wall / rebuild / publicity leaflet / stating problems; do not count same point twice for a & b	1
15		loss of hedge rows / habitats; less biodiversity; A idea, term not needed for mark soil degradation; run off, pollution defined, eutrophication, visual pollution; any 2	2
16		idea that golf course has many more habitats / places to live / environments	1
17		mark for both correct whole points on pasture; mark for both correct intermediate points on course;	2
18		double / twice as many on the golf courses.	1
19		adv: increases biodiversity - idea, term not needed for mark / improves the visual environment / more habitats disadv: impedes drivers view of road / distracts drivers / cars crash into trees / cost – qualified eg maintenance / tree roots damage road / greasy leaves on road ; etc	2
20		more frequent mowing - fewer species owtte; frequent mowing 7 -14 days big impact, 40 days or once a year little difference; (31-33 species) credit to correct use of numerical data;	2
21		natural resources used up ; eg North sea gas / mines closed; increasing demand; why? increasing population / need for consumer goods etc; energy wastage ; example;	2
22		heat; light; (electrical apparatus) for control of / water supply / humidity / shading / ventilation ; trolley transport (2 max) maintains optimum conditions little energy needed to adjust / monitors conditions with sensors / regulates conditions with timers, switches or thermostats / enables rapid response to change; R automatic unless qualified	3
23		plant burnt / fermented / oil extracted / alcohol made; provides heat / gas / fuel / steam; to work turbines / engines; turns generators to give electricity; any 3	3

B493/02 Management of the Natural Environment, Higher tier

Question		Max Mark
1	nitrate R nitrite	1
2	D	1
3	bring whistle and watch; A wear water proof clothing; F	2
4	all decrease except for decomposers which increase eg. decrease increase decrease decrease	2 -1 for each wrong
5	C	1
6	B	1
7	lightning arrow; legume roots; nitrogen gas soil arrow; any 2	2
8	loss of hedge rows / habitats; less biodiversity; A idea , term not needed for mark soil degradation; run off, pollution defined, eutrophication, visual pollution; any 2	2
9	effect 1 mark; detail 1 mark; eg CO₂ - global warming/climate change; detail eg rising seas / polar ice melts / fertile areas to deserts / species migration; acidification - less Ca / Mg / Al available / minerals become insoluble / H ⁺ ions on clay; detail reduces grass / tree growth so less biodiversity / trees more prone to infection / any run affects FW life; water pollution - eutrophication / excess nutrients in water, detail algal bloom / excess weed growth / lack of O ₂ / high BOD / harmful pathogens encouraged;	2
10	forward facing eyes for binocular vision / talons for catching prey / hooked beak for tearing meat; broad wings for catching thermals; any both correct feature and reason needed for mark	1

Question		Max Mark	
11		<p>more alkaline / less acidic / pH value, number increases; R high pH</p> <p>break soil up / improve crumb structure; because particles stick together / flocculate; improved drainage / more air in soil; because of change in structure; more nutrients available / more minerals released; because lime encourages ion exchange / causes more humus break down;</p> <p>any 1</p>	<p>1</p> <p>2</p>
12	12	<p>worms digest leaves, pull in organic material and excrete nutrients / tunnel, aerate soil;</p> <p>slugs digest organic material, excrete nutrients;</p> <p>woodlice digest leaves, decompose organic material and excrete nutrients;</p> <p>bacteria / fungi secrete digestive juices, decompose organic material;</p> <p>A bacteria with role in N cycle explained;</p> <p>R ref to plants roots</p> <p>any 2</p>	2
13		<p>adv: increases biodiversity - idea, term not needed for mark / improves the visual environment / more habitats</p> <p>disadv: impedes drivers view of road / distracts drivers / cars crash into trees / cost – qualified eg maintenance / tree roots damage road / greasy leaves on road ; etc</p>	2
14		<p>more frequent mowing - fewer species owtte;</p> <p>frequent mowing 7 -14 days big impact, 40 days or once a year little difference; (31-33 species)</p> <p>credit to correct use of numerical data;</p>	2
15		<p>yes for Mill Pond;</p> <p>the area total area of the roundabout was less; yet over twice number of species / bugs on trees / on grass were recorded;</p>	3
16		<p>optimum number of quadrats stated - allow 20 to 50; because 50 quadrates get 15 species, further 50 pick up only 3 more species / little point in doing more sampling;</p>	2
17		<p>plant burnt / fermented / oil extracted / alcohol made;</p> <p>provides heat / gas / fuel / steam; to work turbines / engines; turns generators to give electricity;</p> <p>any 3</p>	3

Question		Max Mark
18	<p>provides optimum growing conditions at all times; rapid response to changing conditions; provides predictive responses in management; saves energy / water by reducing heat / evaporation losses; saves labour by providing a programmed / automatic response; enables a record to be kept to improve future practice; any 2</p>	2
19	<p>1900 coal only available 1950 need for plutonium for weapons 1950 clean air act / nuclear considered clean / coal dirty; 1970 North sea gas supply on stream; 2000 dangers of nuclear realised, Chernobyl / global warming - demand for alternatives with no CO₂ emissions and renewable energy use these or other relevant facts to explain the policy changes. R general superficial statements.</p>	2

B494/01 Care of Animals, Foundation tier

Question		Max Mark
1	mouse	1
2	so you don't catch / spread disease	1
3	exploring	1
4	bend her legs keep her back straight	2
5	for work	1
6	daily	1
7	growth / repair; kitten growing;	1 1
8	so he doesn't get bitten / pecked / protect cuts from infection; so it can't flap them (and hurt itself) / cannot escape	1 1
9	cuttlefish / mineral source; substrate / sand; toys / named toy; REJECT bedding	2 max
10	suitable reference to size / temperament / cost / easy to keep;	1
11	grooming; health checks; bonding; taming / get used to handling;; exercise; cleaning <u>cage</u> ;	3 max
12	suitable reference to conformation / markings; REJECT references to condition of fur Grooming;	1 1
13	115 mg;	1
14	fleas;	1
15	mouse;	1

16		easily updated; find data faster; takes up less space; less chance of being lost; less paper needed / paper versions can be printed if needed;	3 max
17		to churn food	1
18		gentle;	1
19		energy; insulation; fat soluble vitamins; protection of body organs;	2 max
20		two ovaries; vagina not cloaca; no egg / shell gland / bird doesn't have uterus;	2 max
21		guinea pig;	1
		75;	1
22		choose <u>longest</u> eared rabbit; breed these together / mate; over several generations;	3

B494/02 Care of Animals, Higher tier

Question		Max Mark
1	mouse;	1
2	guinea pig;	1
	75;	1
3	choose <u>longest</u> eared rabbit; breed these together / mate; over several generations;	3
4	115 mg;	1
5	so you don't get bitten / hurt; so the snake does not get hurt; snake needs firm support;	2 max
6	to churn food	1
7	dull coat;	1
8	to prevent fungal infection	1
9	storing food;	1
10	four;	1
	125 litres;	1
11	easily updated; find data faster; takes up less space; less chance of being lost; less paper needed / paper versions can be printed if needed;	3 max
12	prevent constipation;	1
	<i>Regular Bunny</i> will have less protein;	1
13	iron / other named mineral; vitamin A; vitamin D; other named vitamin; water; (<i>vitamins and minerals = 1 max</i>)	2 max
	used for bone / teeth development; kitten growing rapidly;	2

14		use two tablets; 460mg plus 46 mg; total 506 mg;	2 max
15		weigh container; put animal into container; weigh both container and animal; calculate weight of animal; check / calibrate using known mass;	2 max
16		can become pregnant at 3-4 weeks so must separate before this age; oestrus every 4-5 days so high chance of pregnancy;	2
17		Gerbil; (relatively) easy to clean / maintain / don't require a lot of time / exercising etc; (relatively) cheap to buy / keep; more widely available; take up little space;	1 2 max
18		increased genetic disorders; reduced fertility; lower birth rate; higher mortality rate in young; poor immune system;	3 max

B495/01 Livestock Husbandry, Foundation tier

Question		Max Mark
1	<p>(a) if she turns she could hit someone in the face; someone could walk into it.</p> <p>(b) at your side points facing down.</p>	1 1
2	warm, dry, clean ,well ventilated, draft free, sufficient space, clean water supply. Not food.	max 3
3	HF – roughage or succulent. HN – concentrate HM – succulent	3
4	male / bull	1
5	Sperm Duct – top Penis Testis – bottom	2
6	within the testis - accept vernacular alternatives	1
7	safer for farmer, less harm to other cattle, less bullying of non-horned cattle, easier to handle, no cost implications of removal	1
8	recessive	1
9	posture, sunken eyes, inattentive, shivering, off its food, discoloured or loose faeces, on its own.	max 3
10	B talk loudly so they know you are there	1
11	clockwise - sheep, hen, cow, pig	max 3
12	<p>advantages – Low labour costs / highly mechanised, cheaper meat, easy to care for animals, quicker production</p> <p>disadvantages – Poor public perception, waste to dispose of, high energy consumption /equipment costs, noise/smell</p>	max 2 max 2
13	selective breeding	1
14	numbers of sheep, two populations, one fed hay one silage, making it a fair test, how long, what will be measured	max 4
15	<p>(a) 11-12 weeks</p> <p>(b) it slows down</p> <p>(c) it continues to go up</p>	3
16	<p>indoor sow mortality should be 5% not 3%</p> <p>outdoor feed cost should be £10 not £5</p> <p>indoor labour hours should be 25 not 28 per sow</p>	3

B495/02 Livestock Husbandry, Higher tier

Question		Max Mark	
1		warm, dry, clean, draught free, well-ventilated sufficient space, safe, clean water supply. Not food	max 3
2		milk records- volumes, solids not fats, butter fat, protein, cell count, date of last calving, date of service, sire/dam, no of lactations, illness, medication any suitable. Not signs of ill health	max 3
3		HF – roughage or succulent. HN – concentrate HM – succulent	3
4		safer for farmer, less harm to other cattle, less bullying of non-horned cattle, easier to handle, no cost implications of removal	1
5		the horns are carried on the recessive gene, therefore all the F1 offspring will carry the dominant gene, the mother must be homozygous dominant.	max 2
6		1 in 4	1
7		loss of condition, scratching, loss of hair, increased eating, loss of weight, coughing, visible signs	max 2
8		drenching, bolus, pour on insecticides, vaccinations, isolating new / infected stock, rotating fields, draining fields. REJECT antibiotics / medicines	max 2
9		(a) to encourage milk let down, to encourage them to come in for milking, to provide o production ration, energy, nutrition for milk production. REJECT improve milk quality. (b) those giving more milk will be given more feed to compensate for it	3
10	B	selective breeding	1
11	B	hybrid vigour	1
12		advantages – low labour costs / highly mechanised, cheaper meat, easy to care for animals, quicker production. disadvantages – poor public perception, waste to dispose of, high energy consumption /equipment costs, noise/smell.	max 2 max 2
13		1. benefits of colostrum. 2. less stress for calf, mother, maternal care	1 1
14		increased susceptibility to respiratory disease, stress causes greater susceptibility to many other diseases eg scours, parasite infections, injury	max 2

Question		Max Mark
15	<p>higher sow mortality</p> <p>higher piglet mortality</p>	2
16	<p>sow mortality – increased stress, disease transmission, lack of fresh air exercise</p> <p>piglet – as sow, sow crushes piglets, increased fighting</p> <p>labour – more routine treatments needed, plant maintenance, cleaning out,</p> <p>feed – pigs outside use more energy keeping warm, moving about. Accept take longer to mature therefore eat more</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>

Grade Thresholds

General Certificate of Secondary Education
 Environmental and Land-based Science (Specification Code J650)
 June 2008 Examination Series

Component Threshold Marks

Component		Max Mark	A*	A	B	C	D	E	F	G
B491/01	Raw	36				22	19	16	13	10
	UMS	34				30	25	20	15	10
B491/02	Raw	36	31	27	23	19	16	14		
	UMS	50	45	40	35	30	25	20		
B492/01	Raw	36				22	18	14	11	8
	UMS	34				30	25	20	15	10
B492/02	Raw	36	30	26	22	18	14	12		
	UMS	50	45	40	35	30	25	20		
B493/01	Raw	36				22	19	16	13	10
	UMS	34				30	25	20	15	10
B493/02	Raw	36	30	25	20	15	12	10		
	UMS	50	45	40	35	30	25	20		
B494/01	Raw	36				28	25	22	19	16
	UMS	34				30	25	20	15	10
B494/02	Raw	36	33	30	27	25	21	19		
	UMS	50	45	40	35	30	25	20		
B495/01	Raw	36				30	26	23	20	17
	UMS	34				30	25	20	15	10
B495/02	Raw	36	32	29	26	23	19	17		
	UMS	50	45	40	35	30	25	20		
B496	Raw	109	100	89	76	64	52	41	30	19
	UMS	150	135	120	105	90	75	60	45	30

Overall

	A*	A	B	C	D	E	F	G
UMS	270	240	210	180	150	120	90	60
Cumulative Percentage in Grade	0.1	1.1	8.7	27.8	55.5	79.3	93.6	98.8

The total entry for the examination was 1369

Statistics are correct at the time of publication.

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