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Cambridge Ordinary Level

AGRICULTURE

5038/12

Paper 1

October/November 2016

MARK SCHEME

Maximum Mark: 100

Published

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This document consists of **20** printed pages.

Page 2	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
	Section A	
1(a)	B;	1
1(b)	D;	1
1(c)(i)	transpiration is the loss of water from plant tissue /leaves to the atmosphere;	1
1(c)(ii)	higher temperature, faster rate of transpiration; higher humidity, slower rate of transpiration; higher wind speed, faster rate of transpiration; light intensity, brighter, faster rate of transpiration;	2
	Total:	5

Question	Answer	Mark
2(a)	product relates to cereal crop chosen;	1
2(b)(i)	weed removal / clear the land; remove large stones; cultivate, e.g. plough / dig / turn soil over; prepare seedbed, e.g. rake / fine tilth; prepare holes / drills / pockets to receive seeds; add fertiliser to seedbed; add pesticide to seedbed / drills; pre-irrigate;	3

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Question	Answer	Mark
2(b)(ii)	maintain nutrient levels; maintain soil water / irrigate appropriately; monitor and control pests; weed control method; specific husbandry example, e.g. support beans; pH maintenance, e.g. liming;	3
2(b)(iii)	<i>1 mark for any sign of ripeness relevant to named crop. Allow ECF if non-cereal crop named in 2(a).</i> sign of crop being ripe, e.g. yellow / brown; hard / dried up for cereal; texture / softness of crop; flavour / taste of crop; size of crop; sugar content; <i>Accept appropriate signs for given crop.</i>	1
2(b)(iv)	<i>One mark for method and one mark for appropriate reason related to method given.</i> e.g. using combine harvester; to harvest large area in a short time;	2
2(c)	dry: does not rot / fungi growth restricted / does not germinate or sprout; cool: remains dormant / fresh / does not germinate; dark: to prevent photosynthesis;	2
	Total:	12

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Question	Answer	Mark
3(a)	D;	1
3(b)(i)	24 / 40; 60%; <i>Two marks for correct answer alone.</i>	2
3(b)(ii)	less fertile cows / cows could be ill / operator error / infertile bull or semen straw; timing of service not effective or cow not in season / incorrect feeding;	1
3(b)(iii)	lower milk yield; less cattle for meat; longer calving interval; fewer calves born; higher replacement costs for older cows; costs of repeat insemination;	3
3(b)(iv)	hormone treatment; good general health, e.g. feet; good feeding / supplements; use of teaser males; proper semen storage; trained inseminator; correct timing of insemination; breed with high fecundity; keep a bull with cows all the time;	2

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Question	Answer	Mark
3(b)(v)	when females are on heat / timing of oestrus; number of offspring; year-on-year dates of pregnancy; which service methods (AI or natural) secured highest pregnancy rates for each female; productivity of offspring from different males; details of birth problems for females; <i>Accept other records relating to breeding.</i>	2
	Total:	11

Question	Answer	Total
4(a)(i)	A;	1
4(a)(ii)	liming / add lime;	1
4(b)(i)	bean / pea / groundnut etc.; cereal / grain crop; potatoes / yam / cassava (manioc) / carrots etc.;	3
4(b)(ii)	legume fixes nitrogen; different crops have different root systems / nutrients drawn from different depths of soil profile; different crops absorb different nutrients in different amounts; roots improve soil crumb structure; fallow period allows land to recover;	3
	Total:	8

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Question	Answer	Mark
5(a)(i)	parents Dd dd; gametes D d d d; offspring Dd Dd dd dd; <i>Allow ECF for gametes and offspring if wrong parents shown.</i> <i>Award full marks for correct offspring.</i>	3
5(a)(ii)	dwarf;	1
5(a)(iii)	B; (if correct cross shown in (a)(i)) <i>Allow ECF based on answer of (a)(i).</i>	1
5(b)	select dwarf varieties; cross dwarf varieties / take pollen from one dwarf plant to the stigma of another dwarf plant; isolate to prevent cross-pollination; select again for dwarfism / save seeds produced from this cross to grow on; continue over a number of generations; until pure breeding;	2
5(c)	harvesting easier with dwarf varieties; use less water; drought resistant; resistant to high winds; plants put less energy into stem and more into seed / crop;	2
	Total:	9

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Question	Answer	Mark
6(a)	presence of rumen vs. simple stomach; multiple stomachs (or named / listed) vs. single stomach; named chamber (rumen, abomasum, omasum, reticulum) present in ruminant but absent in non-ruminant; <i>(1 mark for each chamber)</i> length of large intestine larger in non-ruminant; diameter of large intestine larger in ruminant; larger caecum in ruminant;	3
6(b)(i)	X marked on small intestine of cow;	1
6(b)(ii)	Y marked on large intestine of pig;	1
6(c)	egested as faeces / waste products; ref. to regurgitation of undigested material;	1
6(d)	reduces constipation; helps move food through / keeps digestive system moving; helps prevents cancers of the digestive system;	1
6(e)	waste gases are greenhouse gases; methane / carbon dioxide produced; affect global warming / climate change; large volumes of animal waste; animals waste is a source of pollution / disposal or storage issues / run-off into water courses;	2

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Question	Answer	Mark
6(f)	less energy lost as ruminants are primary consumers; can digest cellulose / fibre / more material; grass is an abundant resource; can be inefficient conversion due to fermentation (anaerobic); <i>ORA for non-ruminant.</i>	2
	Total:	11

Question	Answer	Mark
7(a)	C;	1
7(b)(i)	<i>nitrogen:</i> deficiency seen first in older leaves / stunted growth / pale green / chlorotic / yellow / weak and/or spindly new growth; <i>potassium:</i> purple spots on leaves / brown curling leaf tips / scorched leaves / poor flowering or fruiting / yellowing of leaves;	2
7(b)(ii)	add manure; add blood meal (fish and bone); add compost; plant legumes;	2

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Question	Answer	Mark
7(c)(i)	superphosphate; bone meal; CIRP; greensand; named phosphorus compounds; <i>Allow any suitable named phosphorus-containing fertiliser.</i>	1
7(c)(ii)	potash; poultry manure; guano; named potassium compounds; <i>Allow any suitable named potassium-containing fertiliser.</i>	1
7(d)	a fertiliser containing two or more nutrients;	1
	Total:	8

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Question	Answer	Mark
8(a)	do not spray on windy day; so the herbicide does not drift; do not spray near water / do not wash out sprayer in a stream; to avoid water pollution; do not spray near hedgerows, etc.; to avoid impact on non-target species; use recommended dilution of spray; to reduce toxic effects; safe disposal of containers / gloves / mask / clothes; to avoid contamination; wear goggles; to protect eyes; wear mask; to prevent inhalation / swallowing / protect mouth and face; wear gloves; protect hands and skin;	4
8(b)	10; (<i>Accept 10.25</i>) litres / L or dm^3; (<i>Allow 10 000 cm³ (or 10 250 cm³)</i>)	2
	Total:	6

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Question	Answer	Mark
	Section B	
9(a)	particle size, smaller for clay than sandy; water-holding capacity, greater for clay than sandy; drainage, better for sandy than clay; sandy soils warm up more quickly than clay soils at same temperature; workability, easier for sandy than clay; air spaces, larger for sandy than clay; level of organic matter, higher for clay than sandy; nutrient content, higher for clay than for sandy; clay soils more likely to crack than sandy soils; pH, sandy soils tend to be lower pH than clay soils; <i>(Accept clay soils are colder, stickier, heavier for 1 mark each. ORA)</i>	5
9(b)	in the nitrogen cycle nitrogen is made available to plants; this enhances soil fertility; plants cannot absorb nitrogen from the air; free-living bacteria fix atmospheric nitrogen; nitrogen-fixing bacteria in root nodules of legumes fix atmospheric nitrogen; nitrogen needed to make plant proteins for growth; lightning fixes atmospheric nitrogen; nitrogen from decay of organic material, e.g. dung / urine; nitrogen is recycled when dead plants / animals decay; produces ammonium compounds; action of named bacteria or bacteria type; production of nitrites and then nitrates;	7

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Question	Answer	Mark
9(c)	higher temperature, increased photosynthesis / respiration; higher temperature, increased rate of transpiration; higher temperature, higher rate of chemical reactions; higher temperature, more evaporation of water / excessive water loss; higher temperature, wilting / water stress / drought; stomata close and plant cannot absorb carbon dioxide for photosynthesis; extreme high temperatures can denature enzymes / reduce or stop activity; colder temperatures, ice crystal formation / frosted cells; cells burst, plant death; colder temperatures, dormancy or slowed growth; some crops require a period of cold, e.g. conifers, Brussels sprouts;	3
	Total:	15

Page 13	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
10(a)	feed required; extra requirement on top of the maintenance ration; for growth / lactation / reproduction / eggs etc.;	3
10(b)	<i>No mark for the name of the animal, award marks for features appropriate to the named animal.</i> e.g. size, height / area / internal space; roof, materials; roof, pitch / gutters; walls, material appropriate to animal; floor, material; drainage; door(s), appropriate for named animal; windows, style e.g. wire / glass; water supply, troughs / water bowls / pipes / drinkers; ventilation, mechanical / fan / opening / closing windows; heating method / insulation, if required for named animal; feeding, proximity to source of feed / ease of access for machines for feed delivery / racks / rings / troughs; lighting if needed for named animal or farming activities; technology example, e.g. CCTV / eq. to monitor animals / security; isolation facilities; ease of cleaning; location / topography; legislation and codes of practice; environmental modifications, e.g. solar panels, wind turbine; risk minimisation, e.g. fire / pollution / disease; <i>Credit further description of each point to a maximum of 2 marks per point.</i>	7

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Question	Answer	Mark
10(c)	direct contact; transfer of microorganisms; example, e.g. through lesions / spores / licking / rubbing etc.; indirect contact; example, walls / troughs / feed / water / machinery etc.; droplet contact; example, sneezing / coughing; airborne transmission; due to poor ventilation; faecal / oral; due to unclean housing / lack of hygiene; vector; example, human / cats / insects / rats / foxes / badgers;	5
	Total:	15

Question	Answer	Mark
11(a)	higher stocking rate; managed; paddocks / camps; strip grazing / rotational grazing; graze one area and move to another; allow regrowth; ref. to time frame / moving grazing area; higher inputs, e.g. fertiliser; labour, qualified;	3

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Question	Answer	Mark
11(b)	fencing, e.g. enclosed / electric fence; prevents animal selectively grazing; prevents wastage of grass by trampling; inputs to improve quality of grass; choice of grass / forage species with high nutritional value / drought resistance / resistance to trampling / speed of regrowth / durability / perennial / palatability; <i>(Any two for 2 marks.)</i> inputs to improve productivity of grass; example, e.g. fertiliser / manure / liming; plant legumes; weed control / pest control; reduce competition / remove unpalatable / toxic species; irrigate to avoid drought; use of machinery to maintain or improve grass; cultivate / roll / harrow; increase density of grass; control timing of grazing; at best stage of growth; avoid damage when ground wet / frozen etc.;	7

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Question	Answer	Mark
11(c)	increased stocking rate; more animals on same land; animals do not waste energy searching for food; less damage to land / poaching; food is consistent; food is fresh / clean; fodder can be cut when at best / highest nutritive value; greater (fodder) production from land; ration can be controlled; supplements can be added; can expand production without buying / renting more land; easier to control animals / maintain health;	5
	Total:	15

Question	Answer	Mark
12(a)	the movement of water; from a higher water concentration / lower solute concentration to a lower water concentration / higher solute concentration; (<i>Accept correct use of water potential.</i>) across a semi- / partially permeable membrane;	3
12(b)	root (hairs); root hairs increase surface area for absorption; root hairs grow between soil particles to reach soil water; nutrients are dissolved in water; nutrients enter root / root hairs and move through cells; diffusion; active transport; active transport requires energy; against concentration gradient; symbiotic relationships, e.g. microorganisms, to enhance nutrient uptake;	6

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Question	Answer	Mark
12(c)	adding fertiliser / example; increases nutrient content of soil; planting legumes; increase nitrate content of soil; liming; to increase pH / reduce acidity; increase solubility of nutrients; mulching; reduces leaching of nutrients; can provide a source of nutrients; improve soil texture; to increase nutrient-holding capacity / good crumb structure increases nutrient-holding capacity; add organic material to improve soil structure; irrigation; to maintain water capacity / content of soil; drainage; to avoid waterlogging / maintain aerobic conditions; use of green manures; to add nutrient content to soil; use of cover crops; reduces leaching and loss of nutrients through erosion; use crop rotation; maximises utilisation of different nutrients; nutrients available at different soil depths to different crops;	6

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Question	Answer	Mark
	burning vegetation; releases nutrients back into soil; removing weeds; to reduce competition for nutrients;	
	Total:	15

Question	Answer	Mark
13(a)	named biting and chewing pest, e.g. grasshoppers, locusts, termites, leaf miners and beetles; <i>(Allow ref. to animal herbivores.)</i> <i>Any three of:</i> roots, loss of ability to uptake nutrients and water / wilting; flower, loss of reproductive and fruiting ability; leaves, loss of photosynthetic tissue / loss of water; stem, loss of ability to transport sugars and water / plant falls down; fruit, is eaten; entry of disease / pathogens at wound site; pest spreads disease from plant to plant;	4

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Question	Answer	Mark
13(b)	chemical methods; spraying / fumigation; contact / systemic; mode of action, selective or broad spectrum; example of specific chemical; cultural methods; break life cycle of pest; crop rotation; manual removal of pests; physical barriers; burning to remove residue / kill pests; ploughing to expose root pests; weeding to remove host plants; provide alternative host plants; plant resistant varieties; transplant nursery crops once established; timing of planting / harvest to avoid pest; use of traps; biological methods; introduce predator to eat / kill pest; specific example of predator and prey; boost predator population, e.g. by providing suitable habitats; remove competitors of predator; use of sterile males; use of pheromone traps;	6

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Question	Answer	Mark
13(c)	effectiveness of method; cost vs. benefit; specific conditions, e.g. scale of problem / number of pests; cost of chemical; cost of specialist equipment; labour costs; training needs; health and safety considerations / operator safety; harm to (other) crop plants / neighbouring crops; risk of pollution / toxicity; need for safe withdrawal period; premium price for organic products; environmental considerations, e.g. damage to beneficial organisms; timing considerations, e.g. before pests populations peak / time of year; <i>Credit further description of each point to a maximum of 2 marks per point.</i>	5
	Total:	15