
AGRICULTURE

5038/11

Paper 1

October/November 2016

MARK SCHEME

Maximum Mark: 100

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
	Section A	
1(a)(i)	B;	1
1(a)(ii)	A;	1
1(b)	clean; grease / oil; store securely; sharpen; keep dry;	2
1(c)	A;	1
	Total:	5

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
2(a)(i)	<p>e.g. mulching; the placing of a layer of plastic/leaves/bark/grass cuttings on soil surface;</p> <p>minimum tillage/cultivation; very little digging/raking done to preserve soil surface;</p> <p>under sowing; planting a second crop in spaces between the primary crop, maintaining crop cover;</p> <p>shade; prevent sunlight from heating soil;</p> <p>windbreak; prevent moving air from speeding evaporation;</p> <p><i>Accept any relevant method and a description of this method.</i></p>	4
2(a)(ii)	A;	1
2(b)(i)	<p>method to minimise run-off; description of method;</p> <p>e.g. contour/across-slope ploughing; slows the flow of water downhill/increases interception etc.;</p> <p>cover crops/planting belts; binds soil/slows the flow of water downhill etc.;</p>	2

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
2(b)(ii)	soil removed; carries away nutrients, e.g. leached / washed away / blown away;	2
2(c)(i)	D;	1
2(c)(ii)	river / bore hole / rain collection / spring / well; relevant description detail, e.g. pump / connection of pipes / guttering / tank / water butt;	2
	Total:	12

Question	Answer	Mark
3(a)	<i>maintenance ration:</i> sufficient feed to remain healthy / maintain body weight; <i>production ration:</i> additional feed required for growth / lactation / reproduction / eggs etc.;	2
3(b)(i)	chickens peck / use beak / have no teeth; cows use teeth / bite / grip and rip / use tongue;	2
3(b)(ii)	chickens swallow food / store food in crop prior to grinding in the gizzard; cows chew food before storing in the rumen prior to regurgitation / cudging / action of microorganisms;	2
3(b)(iii)	birds void solid (white) urea with faeces; cows produce urine separately from faeces;	2

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
3(c)	(excess) carbohydrate produces fat; obesity / overweight; lack of mobility / joint strain; infertility; heart problems;	2
	Total:	10

Question	Answer	Mark
4(a)	cut down trees; clear bush; stump; burn; use of machinery, e.g. bulldozer / tractor with chain; use of herbicides / ringbarking etc.; use of pigs / goats;	3
4(b)	removal of trees increases run-off; landslip can occur; soil less anchored due to removed tree roots; animal damage, e.g. poaching / paddling / trampling;	2
4(c)	preparation of seedbed; plant pasture grasses / bushes; plant legumes; add fertiliser / manure; irrigation; weed control; fencing to allow pasture to establish;	2

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
4(d)(i)	fencing into paddocks; rotate grazing / eq.; regular fertiliser addition; regular irrigation; <i>Accept other relevant methods.</i>	1
4(d)(ii)	<i>advantage:</i> increased efficiency and levels of production / more stock can be kept on same area / less wastage of grass through trampling and selective grazing / uniform distribution of manure; <i>disadvantage:</i> erosion potential / damage to soil structure / disease / overgrazing / additional costs qualified;	2
	Total:	10

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
5(a)	contact; feed; water; air; vectors / named vector;	3
5(b)(i)	$(116.50 / 50) \times 0.8 = 1.86$ $(115.00 / 50) \times 1.5 = 3.45$ $(114.00 / 50) \times 1.2 = 2.74$ $1.86 + 3.45 + 2.74 = 8.05$ <i>(Full marks for 8.05 or 8.1. Allow ECF for an error in working. Allow one mark for any one or two costs calculated correctly. Allow three costs correct but incorrect addition for 2 marks.)</i>	3
5(b)(ii)	$3.25 + 0.50 + 0.20 / 3.95$ for one mark; 12.00; <i>(Allow 2 marks for the answer in (b)(i) plus 3.95.)</i>	2

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
5(b)(iii)	labour; management; bedding; transport; protective clothing; stress packs; (interest on) loans; packaging; marketing; housing; waste disposal; veterinary fees; treatments which are not vaccines; <i>Accept any suitable costs.</i>	2
	Total:	10

Question	Answer	Mark
6(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
6(a)(ii)	by hand / using appropriate machine etc.; <i>Accept if relevant to chosen crop.</i>	1

Page 9	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
6(a)(iii)	dry / cold / pest free / dark; <i>Accept if relevant to chosen crop.</i>	1
6(b)	insect pests – eat the crop / contaminate as foreign bodies; rats – spoil crop by urine / faeces / eat the crop; fungi – rot the crop; temperature – chilling / shrinking; bruising – physical damage; water content / humidity too high – rot / germination; fire damage – crop cannot be sold / is lost;	2
6(c)	A;	1
	Total:	6

Question	Answer	Mark
7(a)	taken up by plant / translocated through plant; (kills pest) when it ingests the pesticide;	2
7(b)	<i>One mark for value and a second mark for relevant unit.</i> (200/50) = 4 litres OR 4000 cm ³ OR 4 dm ³	2

Page 10	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
7(c)	do not spray on windy day; do not spray near water; do not spray near hedgerows, etc.; use suitable dilution of spray; safe disposal of containers /gloves / mask / clothes to avoid contamination; do not wash out sprayer in a stream;	2
	Total:	6

Question	Answer	Mark
8(a)	an allele is a version of a gene;	1
8(b)(i)	parents $Tt \times tt$; gametes $T \times t$; offspring $Tt \ Tt \ tt \ tt$; <i>(Allow ECF if incorrect parents chosen.)</i>	3
8(b)(ii)	50%; <i>(Allow ECF for a percentage based on the answer given in (b)(i).)</i>	1
8(c)	sows with any normal piglets must be Tt ; ORA	1
8(d)	select pigs without mule foot; breed only these; cull / eliminate / eat / do not breed from pigs with mule foot;	2
8(e)	genetic variation / (potential for) hybrid vigour;	1

Page 11	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
8(f)	do not need to keep male; easier management of reproduction; possible cost savings qualified; reduced injury to female; reduced injury to farmer; reduced disease transmission; can pick the best males; one male can service many females; can use semen from distant males;	2
	Total:	11

Page 12	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
	Section B	
9(a)	process by which plants make their own food; reaction between carbon dioxide and water; produces glucose / synthesises carbohydrate; and oxygen; light required / energy taken in; chlorophyll;	4
9(b)	temperature – higher temperature, faster rate; humidity – higher humidity, slower rate; wind speed – higher wind speed, faster rate; light intensity – brighter, faster rate;	4
9(c)	root hairs; move across root cells; positive pressure from roots (push of root gradient); negative pressure from leaves (pull of leaf gradient); transpiration pull / stream; water movement up the plant to leaves through xylem; capillary action; osmosis / diffusion; into (spongy) mesophyll; water lost from intercellular / air spaces in leaves; water replaced from cortex cells in roots; water out of leaf by diffusion / high to low concentration of vapour / down concentration gradient; stomata; max. 1 mark for further stomata detail, e.g. guard cells; evaporation from leaves / lost as water vapour;	7
	Total:	15

Page 13	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
10(a)	<p><i>lactation:</i> period of production of milk; by female / mammal; mammary glands; (before or) after giving birth; ref. to lactation hormones;</p> <p><i>weaning:</i> infant or young mammal; progression to food other than its mother's milk; start to take solid food; no longer rely on mother for feeding;</p> <p><i>(Max. of 3 marks for either definition alone.)</i></p>	4
10(b)	<p><i>Marks must be relevant to named animals.</i></p> <p><i>during pregnancy:</i> drying off; vaccination; nutrient intake of mother / feed / dietary supplements; high-protein feed; feed quality increases as intake declines; regular checks on mother's health during pregnancy; isolation of mother;</p> <p><i>birth:</i> safe from predators; suitable bedding / warm environment; regular monitoring; minimise birth trauma / ropes / vet support; remove mucus from nose; ensure offspring is breathing;</p>	7

Page 14	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
	<p><i>care of newborn young:</i> ensure suckling / stomach tube; ensure bonding; vaccination (<i>Allow once.</i>)</p> <p><i>Allow credit for species-specific actions.</i></p>	
10(c)	<p>provides antibodies against disease; animals are born without immunity / confers passive immunity / resistance; source of fluid; high in protein / vitamins / electrolyte / fats; purgative to help movement of early stools; reduces scouring; improves feeding efficiency;</p>	4
	Total:	15

Question	Answer	Mark
11(a)	<p>DNA of a plant has been modified; genetic engineering techniques; microorganisms (e.g. bacteria) used; DNA / sections of genetic material transferred; between individuals of same or different species; new (desirable) traits introduced; example; in a way that does not occur naturally;</p>	4

Page 15	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
11(b)	<p><i>Max. 3 marks for either advantages or disadvantages alone.</i></p> <p><i>potential advantages:</i> crops are more productive / have a higher yield; more crops can be grown on relatively small areas; offer more nutrition and flavour; could eliminate allergy-causing properties in some foods; inbuilt resistance to pests, weeds and disease; more environmentally friendly as they require less herbicides and pesticides; less use of pesticides could reduce costs; crops grow in regions with poor soil or adverse climates; foods have a longer shelf life;</p> <p><i>potential disadvantages:</i> fear of unknown may limit consumer market; techniques are not fully developed; consequences are not fully understood; genes do not work in isolation, changing a few could have unpredictable results; crops pose a risk to diversity as the plants could be much more dominant; herbicide-resistant and pesticide-resistant crops could give rise to super-weeds and super-pests that would need newer, stronger chemicals; GM crops cross-pollinate with nearby non-GM plants; possible ecological problems, e.g. with GM foods containing vaccines, antibiotics, or contraceptives; GM technology companies patent their crops; may have to buy expensive seeds every year; the new technology may require higher inputs, which interferes with traditional agricultural methods, which may be more suited to local environments; reduces genetic biodiversity / gene pool within a crop;</p>	5

Page 16	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
11(c)	select the best varieties; desirable characteristics; example of desirable characteristic; detail of how this will be selected for; cross these varieties; select again for suitable crops; repeat over a number of generations; improve crop characteristics; to speed up natural changes;	6
	Total:	15

Question	Answer	Mark
12(a)	fix nitrogen; nodules; bacteria / <i>Rhizobium</i> ; increase availability of nitrogen compounds; for the crops that follow / to precede nitrogen-hungry crops; example of a legume; accept use as a break crop; plant material improves organic matter content and soil structure; description of an example rotation involving legumes;	4

Page 17	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
12(b)	<p>sampling method, e.g. random / W-shape / cover all areas of field; use of GPS; tool used, e.g. auger; depth (not at immediate surface); mixing detail; repeats; detail of repeats, e.g. depth and location; remove contaminants; mix with water; add barium sulfate / flocculating agent; add an appropriate indicator / using pH meter; shake and leave; calibrate pH probe; place probe in water; compare with colour chart / read off scale; colour / probe-reading detail;</p>	7

Page 18	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
12(c)	<p><i>how soil becomes acidic: (max. 2 marks)</i></p> <p>addition of manure; (decomposers release) H⁺ ions from ammonium compounds; ion exchange during leaching increases H⁺ ions; ion exchange during crop growth / fertiliser application increases H⁺ ions; microorganisms release CO₂; which combines with water to form an acid; inorganic fertilisers reduce soil pH; rainwater is naturally acidic; decay of organic matter releases humic acid;</p> <p><i>effect on soil fertility: (max. 2 marks.)</i></p> <p>acid soil has lower nutrient availability; pH 6.5–8 is the pH at which most nutrients are available; increased aluminium solubility leading to toxicity; reduced microbial activity, e.g. nitrogen fixation by legumes / reduced activity of beneficial organisms;</p>	4
	Total:	15

Question	Answer	Mark
13(a)	control using a natural enemy; example, e.g. predator / bacterium / virus / parasite / pathogen; feeds on / destroys pest; reduces pest population; does not harm crop;	3
13(b)	crop rotation; to break life cycle of pest; burning; removes waste material and kills pest; ploughing; exposes eggs or larvae; weeding; removes host plants; use clean / certified seeds; pest not present; pest scaring techniques, e.g. noise / scarecrow; keeps pest off / away; intercropping; provides alternative hosts / repel pests; choice of planting / seeding time; avoids pest window; use resistant varieties; crop is not affected;	7

Page 20	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5038	11

Question	Answer	Mark
	nursery crops; transplant when established plants; nets; as a physical barrier;	
13(c)	can be targeted / specific; yields increase, due to less pest damage; less labour needed than cultural methods; cost effective, qualified; fast acting compared to biological control; generally very effective; suitable for large-scale agricultural production; variety of forms for convenient application, e.g. granules, dust, emulsion, aerosol etc.; can be used to pre-treat soils or seeds before pests arrive;	5
	Total:	15