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Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

AGRICULTURE **0600/13**

Paper 1 **October/November 2019**

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.

Cambridge International will not enter into discussions about these mark schemes.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Question	Answer	Marks
1(a)	the cultivation of a single crop; in an area; year on year / over time;	**2**
1(b)(i)	build-up of expertise / knowledge; easy to keep own seed; large volume of product to sell / strong market position; allows for economies of scale; may be only one main type of pest to target; may be only one main type of weed to be controlled; consistent method of processing and storage; specific fertiliser strategy possible; simpler management; fewer types of machinery; less training needed / workers require smaller range of skills; high yield of one crop means easier marketing;	**2**
1(b)(ii)	yields decline over time; same crop year after year damages soil; possible soil erosion; single pest type can destroy the whole crop; pest / disease builds up on crop year after year; one crop may be more vulnerable to specific environmental problems; farm has no other crop to provide an income; specific nutrients can become depleted; soil pan formation; increased environmental / pollution risk due to chemical use;	**2**

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Question	Answer	Marks
2(a)	C;	1
2(b)	D;	1
2(c)(i)	reduced germination; slowed growth; water stress; excess transpiration; wilting; enzymes denatured; seedlings die;	2
2(c)(ii)	*Accept any relevant method and an explanation of this method, for example:* mulching / the placing of a layer of plastic / leaves / bark / grass cuttings on soil surface; to reduce water loss from the soil; minimum tillage / cultivation / very little digging / raking done; to preserve soil surface; under sowing / planting a second crop in spaces between the primary crop; to maintain crop cover; shade / prevent sunlight reaching the soil; reduces heating from the Sun; cover crops / planting belts; binds soil / slows the flow of water etc.; irrigation / supplying water / replace (excess) water loss; cools plant / maintains cellular reactions / for transpiration / for photosynthesis;	2
2(d)	effect on flowering / reduced pollination / reduced water availability / fruit damage / soil heaving pushes out plants / breaks roots / destroys tissues / cells / ice crystals form in cells / cells burst / plants die;	1

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Question	Answer	Marks
3(a)	root hairs; vascular tissue; stomata;	**3**
3(b)	higher humidity reduces rate of transpiration; because of lower concentration gradient / water gradient / the water evaporates more slowly (into saturated air); increased wind speed increases rate of transpiration; because water is removed from leaves more easily / the boundary layer of saturated air is removed from the leaf surface / maintains concentration gradient / by removing water molecules;	**4**
3(c)	low levels of oxygen / aeration in root zone / anaerobic conditions; reduced (aerobic) root respiration; anaerobic root respiration increases; root tissues decompose / rot / roots die; increase in certain pests / diseases, e.g. snails and fungus which damage roots; poor / slow / low / shallow growth of root;	**2**

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Question	Answer	Marks
4(a)	*Accept activities up to planting point, for example:* cut down trees; stumping; burning; weed removal; remove large stones; cultivate, e.g. plough / dig / turn soil over; prepare seedbed, e.g. rake / harrow / create fine tilth / level; drill (for appropriate crop) / prepare holes / pockets to receive seeds / plants; add fertiliser / manure to seedbed; pesticide to seedbed / drills; irrigate; ensure correct pH / lime;	**3**
4(b)(i)	*No mark for crop.* 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; tops may die down;	**2**
4(b)(ii)	*cool:* low temperature prevents germination / growth / remains dormant / fresh / reduces respiration / prevents drying out / avoids the outbreak of pests / diseases; *dry:* lack of water so does not rot / prevents fungi / microbe growth restricted / does not germinate / sprout;	**2**
4(c)	product related to named crop; e.g. wheat – flour; maize – porridge;	**1**

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Question	Answer	Marks
5(a)(i)	B;	**1**
5(a)(ii)	B;	**1**
5(b)(i)	*Accept any named boring pest, e.g.:* weevil / stalk borer / American bollworm;	**1**
5(b)(ii)	weaken plant; plant falls down / tissue damaged; plant dies; plant loses water; reduced photosynthesis / reduced growth rate; water / sap-bearing tissue destroyed / loss of sap; site for entry of pathogens / diseases / pests;	**3**
5(c)	organic status; to protect (other) crops; to protect beneficial insects; farming philosophy / to avoid pollution; cost of chemical / equipment; lack of expertise / knowledge; lack of availability of specialist equipment; availability of chemicals; danger to farmer / staff; legislation / local rules / schemes prevent use;	**2**

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Question	Answer	Marks
6(a)	4 types of / named crops / or a fallow period; suitable order for crops over time described;	**2**
6(b)	*explanation:* fertiliser containing more than one nutrient; *example:* NPK; *Allow named example and ratios.*	**2**
6(c)	correctly labelled axes with appropriate scale; points plotted correctly; line of best fit; *Accept a curved line of best fit, accept a line that ignores outlier.*	**3**

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Question	Answer	Marks
7(a)	*For example:* hair loss; discoloured / cloudy urine; faeces contains blood / worms / sticking to coat; watery / dull / sunken eyes; rib cage stands out; poor stance / head down / drooping; cough / sneeze / nasal discharge; panting / breathing fast; change in nasal moisture; lethargy; no appetite / won't eat; isolated; erratic behaviour / aggression; weight loss; rough coat; high temperature; some animals die unexpectedly; lack of libido / mating;	**3**
7(b)	*Credit relevant descriptions of transfer, for example by:* secretions; lesions; spores; licking; rubbing; food; water; walls; troughs; droplet contact / coughing / sneezing; air; faecal / oral; vectors;	**2**
7(c)	must by law be reported to ministry / vet / authorities etc.;	**1**

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Question	Answer	Marks
7(d)	remove infectious agents; remove waste / faeces / urine; reduce pest / disease burden; regular cleaning of walls / floors / where animal lives; supply of clean water / food; use of disinfectants / iodine dip / foot baths; clean bedding; handler cleanliness / protective clothing / change clothes; cleanliness of equipment; isolate sick animals; regular checks / record keeping; keeping area dry; provide good ventilation; reduce vermin;	**3**

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Question	Answer	Marks
8(a)	*1 mark for each correct labelling of:* caecum; large intestine; rumen; small intestine;	**4**
8(b)	*caecum:* absorb fluids / salts; mixes contents; receives undigested material from the small intestine and passes to the large intestine; lubrication with mucus; contains (specialised) microorganisms; *large intestine:* absorption of water; passes waste (to the rectum / anus); *rumen:* mechanical processing / churning; storage prior to regurgitation; fermentation; fibre breakdown; contains (specialised) microbes; *small intestine:* digestion; nutrient absorption / absorption of named nutrient; receives secretions (from the pancreas and the gall bladder);	**4**

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Question	Answer	Marks
9(a)	a characteristic / allele that is not expressed in the presence of a dominant characteristic / allele; an allele that is only expressed if the individual has two copies of / is homozygous for the recessive allele;	**1**
9(b)(i)	*genotypes of parents:* Rr x Rr; *gametes of parents:* R r R r; *offspring genotypes and phenotypes:* rr (resistant) Rr Rr RR (not resistant);	**3**
9(b)(ii)	A;	**1**
9(c)	increased yield / increased income / reduced need for vector / pest control / disease control / lower cost of crop protection;	**1**
9(d)	select for suitable characteristics / select best parents; cross these to produce offspring / next generation with improved characteristics; select again for suitable characteristics / until breeding is true; over several generations;	**2**

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Question	Answer	Marks
10(a)	*Climate / topography factor should link to farming practice for each mark, for example:* temperature too high artificial / modified environment needed to grow crops; temperature too low protect crops / livestock, e.g. house / greenhouses rainfall too high / waterlogging / standing water improve drainage / grow crops such as rice / grow water-hungry varieties / crops; rainfall too low irrigate; high run-off use terracing / ditches / bunds etc.; topography too steep to cultivate by machine; cultivate by hand / use suitable animals / grow perennial varieties; high altitude / too cold provide shelter / shelter belts; high winds windbreak / maintain ground cover;	**4**

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Question	Answer	Marks
10(b)	market / demand increases; need for higher yields; more intensive practices; use of more fertiliser; higher-yielding varieties; more efficient pest control / greater use of pesticides; pressure on land availability, e.g. for recreation; increased pollution / pollution risk; more waste to dispose of; may need to relocate facilities, e.g. abattoir; land prices increase; increased risk of theft; increased risk of trespass / damaged crops / livestock due to dogs etc.;	**4**
10(c)	terracing; to prevent run-off / rapid flow of water directly downhill; contour plough / plough across not down slope; to prevent run-off / hold soil in place; plant vegetation / cover crops / trees; to bind / hold soil; to slow water flow / to take up water through roots; do not overgraze / overstock; to avoid bare soil; mulching; to hold soil / prevent it washing downhill; add organic matter; to improve soil / crumb structure; use drainage pipes / channels / ponds; to control / manage water flow;	**7**

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Question	Answer	Marks
11(a)	*photosynthesis;* synthesis of carbohydrates / glucose; production of oxygen; *requirements:* carbon dioxide; water; chlorophyll (green pigment); light required / energy in;	**3**
11(b)	oxygen in for respiration; oxygen out from photosynthesis; carbon dioxide out from respiration; carbon dioxide in for photosynthesis; gases diffuse / into the intercellular spaces; through stomata / pores (in their leaves); detail, e.g. open when turgid; detail, e.g. closed when flaccid; light / temperature dependent; water vapour out in transpiration; water vapour out (or in) by diffusion; due to evaporation from leaves;	**5**
11(c)	translocation; of soluble; sugars / synthesised food; in the phloem; source (mature leaves); to sink (where the carbohydrate is needed or stored) / all parts of the plant; at other times stored food is mobilised to other parts of the plant; roots / flowers / fruits / stems / developing leaves; to storage organs; for example, tubers; as insoluble / complex carbohydrates; for example, starch;	**7**

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Question	Answer	Marks
12(a)	rain is naturally acidic; more acidic rain due to pollution; overwatering / irrigation / heavy rainfall; use of large amounts of compound / ammonium fertiliser; burying crop residues; intensive cropping; soil left bare / uncultivated; calcium leaching from soil; addition of manure / dung; urine;	**3**
12(b)	*sampling:* W method / sample areas; tool used, e.g. auger; depth (not at immediate surface); mixing detail; repeats; detail of repeats; use of GPS; avoid contaminants; *test:* remove contaminants; mix with water; add barium sulfate / flocculating agent; shake and leave; add an appropriate indicator / using pH meter; calibrate pH probe; place probe in water; compare with colour chart / read off scale; any colour / probe-reading detail;	**5**

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Question	Answer	Marks
12(c)	ions dissolved in water; so can move and diffuse; ion exchange; with ions from plant roots; active transport; as is against concentration gradient; requires energy; through roots / root hair cells; increase surface area for diffusion; symbiotic relationships; for example microorganisms, e.g. Rhizobium / fungi enhance root surface area; carrier proteins in root hair cells; enhance uptake; diffusion; may enable some ions to move across root cells; transpiration stream / positive pressure from roots / (push of root gradient) / negative pressure from leaves / (pull of leaf gradient); so minerals move to where needed;	**7**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>13(a)</td><td>the combination of genetic information from two parents;
male AND female;
gametes;
fusion (of gametes / sex cells);
form a zygote;
involves fertilisation;
genetic information mixes;
offspring that are not identical to parents;
sexual reproduction leads to variety in the offspring;</td><td>3</td></tr>
<tr><td>13(b)</td><td>Max. 3 marks for parts alone.
<table><tr><th>parts</th><th>function</th></tr><tr><td>receptacle;</td><td>supports the flower / flower grows from here;</td></tr><tr><td>petal;</td><td>attract insects;</td></tr><tr><td>sepal;</td><td>protects unopened flower;</td></tr><tr><td>stamen;</td><td>male part of flower / consists of anther and filament / produces male sex cells / pollen;</td></tr><tr><td>anther;</td><td>produces male sex cells / pollen;</td></tr><tr><td>stigma;</td><td>collects / traps pollen;</td></tr><tr><td>ovary;</td><td>produces female sex cells / ovules / forms fruit after fertilisation;</td></tr><tr><td>filament;</td><td>presents anther / moves for distribution of pollen;</td></tr><tr><td>style;</td><td>presents the stigma where it can collect the pollen;</td></tr><tr><td>nectary;</td><td>produce nectar to attract insects;</td></tr></table></td><td>7</td></tr>
</table>

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Question	Answer	Marks
13(c)	creates genetic diversity; can introduce desirable genes; variation in population / greater range of characteristics; for example, disease-resistant varieties; pest-resistant varieties; species can adapt to habitat; species can adapt to new habitats / species can grow in a range of climates; population may be more resilient; can lead to hybrid vigour; disease may not affect all the individuals in a population; less prone to extinction / promotes survival; creates unique individuals; can lead to higher yields / improved characteristics; reduced risk of total loss / loss of whole crop;	**5**

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Question	Answer	Marks
14(a)	*Credit description to include:* uterus; cervix; vagina; vulva; ovary; oviduct; *Accept diagrams.*	**4**
14(b)	*No mark for the name of the animal.* *For example:* udder swells; lactation starts; baby kicks / moves in its mother's stomach; mother isolates itself; animal in pain / vocalising; vaginal discharge / lubrication; pelvis relaxes; baby moves into position; tail lifting / other signs; cervix dilates; waters break; pushing / straining; contractions; pushing offspring out; correct or incorrect birth position described; of pelvic canal; umbilical cord breaks; membranes / placenta come out / cleansing; offspring starts to breathe; offspring tries to stand up; mother licks offspring; offspring suckles / takes milk; mother may eat / hide placenta;	**5**

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Question	Answer	Marks
14(c)	immediate care: clear mucus from nose; so can breathe by itself; vaccinate / other veterinary care; to prevent attack of diseases; housing: dimensions big enough for animal; so can move around / not get lost / trapped / enables exercise; flooring: should be easy to clean / pest free; to maintain hygiene / health; should be a rough surface; to prevent slipping / injury; bedding: dry / clean / comfortable; to prevent disease / stress; stress reduction: reduce noise / provide security / enrichment / lighting; to enable animal development / not to be scared / prevent injury; socialisation: do not house alone all the time; to minimise stress / help animal to play / build up strength / keep animal calm; temperature control: keeps animal at correct temperature; allowing optimum animal welfare; ventilation: avoid draughts / provide good ventilation; prevent chills / respiratory diseases; water: provide water; to avoid dehydration / enable cellular reactions;	**6**

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Question	Answer	Marks
14(c)	feeding: help animal to suckle; ensures animal is feeding / colostrum to confer immunity / provide antibodies / high protein / vitamins / electrolytes; specific feeding: provide high protein / energy / carbohydrates / provision of roughage / introduce solid food; for rapid growth / stimulate rumen / prepare for weaning; husbandry: health care / disease control; to ensure the animal is not affected by pest / disease; records: accurate record keeping; to ensure well-being of animal; *Credit other valid points and species-specific care.*	