Cambridge Assessment International Education

Cambridge IGCSE™

AGRICULTURE **0600/11**

Paper 1 Theory **October/November 2022**

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.

Cambridge International is publishing the mark schemes for the October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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.

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.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)	*system 1:* less machinery needed; economies of scale; fewer operations needed; farmer can specialise in one crop / allows specialist knowledge; *system 2:* makes use of spare ground; may reduce pests / disease; spreads risk; reduces soil erosion; different crops take nutrients from different depths of the soil; *system 3:* legumes add nitrates / nutrients to the soil; rotation helps break pest life cycle; better utilisation of soil resources;	**3**
1(b)	choose a young shoot; choose a healthy shoot; cut at an angle; shoot should have (at least 3) buds; use rooting powder; plant in (well-prepared) soil / root in water; cutting planted to a depth of half its length **OR** plant horizontally; plant at a slope to allow water run-off / prevent (top) from rotting;	**3**
1(c)(i)	close to port so reduces transport costs; low altitude therefore temperature warmer; sheltered location therefore less windy / less crop damage; costal land is flat therefore easier cultivation; population tend to be centred around the coast therefore easier access to markets; likely to be high population area so labour readily available; fertility may be better at the coast so better crop growth; soil may be lighter at the coast so easier cultivation / rooting;	**2**

Question	Answer	Marks
1(c)(ii)	irrigation / description of irrigation;	**1**

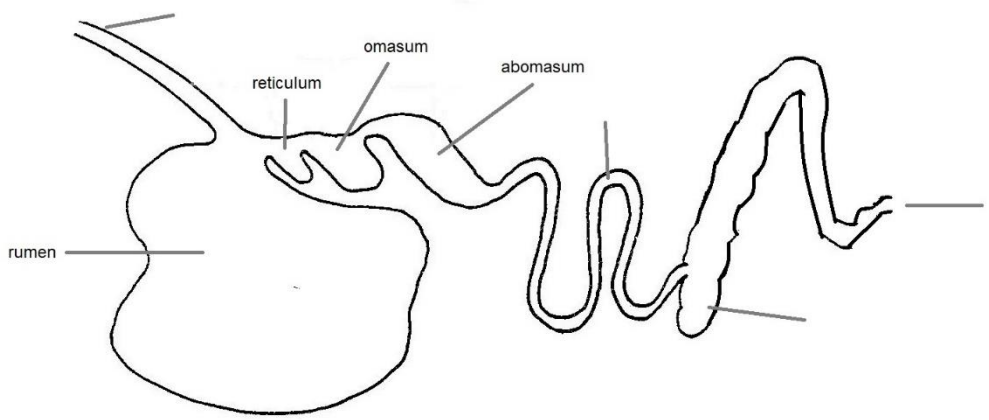
Question	Answer	Marks
2(a)	leaving cover crops; improving soil humus / add organic material; use drip irrigation; terracing; maintain correct stocking levels; reduce use of insecticides / inorganic fertiliser; minimal cultivation; avoid use of heavy machinery (causing compaction); use crop rotations; contour ploughing; wind breaks / maintain hedges / tree cover; use of mulch; varying the depth of ploughing; create drainage ditches / build bunds to divert water;	**4**
2(b)(i)	medium sand;	**1**
2(b)(ii)	humus / organic material; soil organisms; water; air;	**2**
2(c)	*1 matched for 1 mark.* *2 / 3 matched for 2 marks.* nitrogen – stunted growth with yellow leaves; phosphorus – purple leaves and small roots; potassium – yellow leaves with dead spots;	**2**

Question	Answer	Marks
3(a)(i)	large surface area to absorb light; thin to allow carbon dioxide to reach all parts; waxy cuticle helps reduce water loss; chloroplasts / chlorophyll needed for photosynthesis / to capture light energy; upper epidermis is clear to allow light to reach chloroplasts; stoma allow gas exchange; stoma allow transpiration; vascular bundle for transport; cell walls give support to leaf;	**3**
3(a)(ii)	oxygen; carbon dioxide; water vapour;	**2**
3(b)	C;	**1**
3(c)	shading, example, e.g. use of nets / trees, etc.; mulching; misting / spraying with water (to keep cool);	**2**
3(d)	B;	**1**

Question	Answer	Marks
4(a)(i)	as distance between individual plants increases the total crop yield increases; up to a point when total crop yield begins to level off / stops increasing;	**2**
4(a)(ii)	competition for: light; nutrients; water; space; increased disease and pest transmission if too close;	**2**

Question	Answer	Marks
4(b)(i)	difficult to dig out all weed roots / many weeds can grow from roots / cutting up roots can propagate some weeds / contamination of crop with weed seeds / weed root may be within crop;	**1**
4(b)(ii)	if they set seed more weeds will grow from these / prevent them from reproducing;	**1**
4(b)(iii)	some weedkillers may remain in the crop and be present if harvested too quickly after spraying; farmer can know when it is safe to respray; farmer can see if the spray is working; to avoid excess spraying / use of chemicals / causing pollution;	1

Question	Answer	Marks
5(a)	*crop rotation:* breaks the pest's lifecycle; *ploughing:* exposes the pests, e.g., to predators / sun **OR** buries eggs / the surface pests, etc. / kills weeds which may harbour pests; *systemic pesticide:* goes inside the plant and kills the pests when they feed on the plant;	**3**
5(b)	apply when still / not windy / do not spray into wind; do not use when rain is forecast; read and follow instructions; ensure correct dilution; wear protective clothing; ensure spray only goes on to the crop; do not spray near watercourses; do not eat / drink while spraying; wash equipment after use; wash hands / shower after use; retain original container;	**3**
5(c)	D;	**1**

Question	Answer	Marks
6(a)	*One mark for each correctly labelled structure.*  	**4**
6(b)	act as catalysts / speed up digestion; make insoluble molecules soluble; make large molecules smaller;	**2**
6(c)	large intestine / colon;	**1**

Question	Answer	Marks
7(a)(i)	10 days / 10–25 days;	**1**
7(a)(ii)	6 days;	**1**
7(a)(iii)	1.5	**1**

Question	Answer	Marks
7(b)	*Explanation required for credit, for example:* gives calf mother's antibodies for immunity to disease; provides additional protein for growth; provides additional fat for energy; provides energy for starting to look for own food / healthy activity; provides additional vitamins / minerals to promote health; triggers the digestive system which helps young animals to digest food; promotes gut health which helps prevent diarrhoea / improves digestion; provides fluids so helps prevent dehydration; colostrum creates a bond between mother and calf so the mother can recognise her calf;	**3**

Question	Answer	Marks
8(a)	*advantage:* cattle can protect themselves from predators; males with horns more likely to be successful at mating; horns are a valuable product / can be sold; cattle with horns may be considered more visually appealing; *disadvantage:* farmer may be hurt by horns; cattle with horns can bully hornless cattle; managing animals with horns is more difficult indoors as they need more space; hides can be damaged by horns; horns can get trapped in fences, etc.;	**2**
8(b)(i)	D;	**1**

Question	Answer	Marks
8(b)(ii)	*1 mark for the genotype of the bull.* *1 mark for the genetic diagram with justification.* hh / the bull is homozygous recessive; Hh × hh Hh hh Hh hh **AND** no other combination gives 50% with no horns / this gives 50% with no horns;	**2**
8(c)(i)	artificial insemination / AI;	**1**
8(c)(ii)	cheaper than keeping a bull; safer than keeping a bull; prevents inbreeding through using one bull; gives access to better blood lines; enables farmer to choose specific characteristics to breed into the herd; reduces disease transmission; prevents injury during mating; semen can be checked for defects; can be more successful than natural breeding; allows storage of sperm from quality animals for a long time; may be easier to synchronise when calves are born; may be easier to impregnate multiple animals; allows breeding with lame animals;	**3**

Question	Answer	Marks
9(a)	animals could escape and hurt themselves / could hurt themselves while escaping; predators could get in; animals could be hurt on loose materials; dirty housing can lead to disease / parasites; rain and cold could lead to illness in animals;	**2**
9(b)(i)	18;	**1**
9(b)(ii)	360;	**1**
9(c)(i)	prevents rotting / rusting; prevents insect damage, e.g. termites; *Answers must be different.*	**1**
9(c)(ii)	so that the animals cannot push through the fence; tight wire helps to support the fence; to avoid animals injuring themselves on loose wire: *Answers must be different.*	**1**
9(c)(iii)	so that the animals cannot get over the fence; to keep predators out; *Answers must be different.*	**1**

Question	Answer	Marks
10(a)	demand for land for housing; demand for land for infrastructure; demand for land for industry; loss of land due to erosion; loss of land due to pollution; expansion of deserts; global warming; conservation areas where agriculture is forbidden; areas lost due to mining; loss of land to leisure / parks, etc.; loss of land due to salination;	**4**
10(b)	higher yielding / resistant varieties; selective breeding; GM crops; reduced field losses, e.g. pest / weed / disease control; use of fertilisers; mechanisation; protected cultivation, e.g. polytunnels; hydroponics; crop rotation; rotational / zero-grazing methods; irrigation; mulching; monoculture; education of farmers / staff / use of agricultural colleges;	**6**

Question	Answer	Marks
10(c)	damage caused by overstocking; soil compaction / poaching around troughs / gates / loss of plant cover; damage caused by mechanisation; such as soil compaction / soil pans / plough soles / erosion caused by cultivation of steep slopes; water pollution; from fertiliser application (causing eutrophication) / use of pesticides (reducing diversity) / sediment run-off (increasing turbidity); killing of non-target species; by pesticide / herbicide application; loss of habitats; from clearing natural forest / trees / bush areas for agriculture (reducing biodiversity); monocultural agriculture; damage to soil structure leading to soil erosion; damaging soil structure; increased use of inorganic fertilisers; increased soil acidity; from overuse of ammonium fertilisers / manure / overwatering; global warming increased; from forest burning / use of fossil fuels in agriculture / keeping more cattle (methane); gene pool pollution / loss of genetic diversity; from escape from GM crops / fewer varieties of main agricultural crops grown;	**5**

Question	Answer	Marks
11(a)	removing trees / bushes / large rocks; treating with selective herbicides to remove weed species; ploughing / levelling: preparing a seedbed; re-seeding with improved grass varieties; improving drainage; fertiliser application; pH modification; improving soil by adding organic materials; growing legumes; using rotational grazing / installing fences; using irrigation;	**7**
11(b)	grass grows better with less competition so more available for cattle to feed on; fewer unpalatable species in the field so cattle eat more in total; improved drainage means more cattle can be kept on the same area of land without causing damage by overstocking; the quality of the grass growing is better so more nutritious for the cattle that feed on it; fertiliser application / pH modification results in increased growth of grass, supporting more cattle; irrigation of pasture ensures grass grows when water is in short supply / grass keeps growing providing food for livestock; growing legumes provides nitrogen for the growing grass so increases output;	**4**
11(c)	fences allow the farmer to have more control of when and where the cattle feed; allows farmer to use rotational grazing; rotational grazing means cattle eat all the available grass with less wastage; fences prevent other animals eating the grass meant for the livestock; fences can be used to allow grass to recover by excluding livestock; fences can be used to aid management of animals / pasture and so keep pasture healthy / exclude animals as needed;	**4**

Question	Answer	Marks
12(a)	*1 mark for the factor considered. No mark for naming a material. 1 mark for an example used to support, for example:* cost of the materials; wood or thatch can be free if available on the farm, metal and concrete may have to be bought in; the animals being kept; size / environmental requirements (warmth, etc.), likelihood the animals might damage the housing / poultry do not require as robust a house as cattle; local availability of materials; thatch and wood might be locally available where concrete may not be; local environmental conditions; temperature / wind rainfall / likelihood of typhoons; durability of the materials; wood susceptible to rot / termite damage while metal concrete is not; amount of maintenance needed; wood / metal may need treating, brick concrete does not; weather conditions; thatch, etc. absorb water / metal not suitable if very hot;	**7**
12(b)	water is needed for many metabolic processes therefore water is needed for health and welfare of livestock; water is needed for temperature regulation allowing the animal to sweat; dirty water is unpalatable therefore animals do not drink enough; dirty water can contain materials poisonous to livestock causing illness; dirty water can transmit disease to livestock causing illness; dirty water can contain parasites reducing livestock productivity; clean water is important for productivity for some animals, e.g. for milk production; clean water is needed to keep the animals hydrated;	**4**

Question	Answer	Marks
12(c)	settling; water is allowed to remain still / in a reservoir; large (suspended) particles fall to the bottom of the reservoir; clean water is drawn off from the top of the reservoir; filtration; water is passed through a material; materials include sand / paper filters; filter catches (suspended) particles; cleaner water passes through; *Allow other methods, e.g. chlorination, flocculation, screening.*	**4**

Question	Answer	Marks
13(a)	For example: local availability; local demand / market; weather conditions / seasonality; production time; topography; soil type / feature of soil; fit with other crops / livestock produced; profitability; local pests / diseases; processing availability; regulatory framework; government encouragement, e.g., subsidies; capital investment required, e.g. inputs / mechanisation; labour costs / requirements; availability of skills / future training required;	**5**

Question	Answer	Marks
13(b)	*No mark for naming crop.* removal of previous crop / weeds, etc: destoning; ploughing / digging; addition of manure; addition of fertiliser; pre-emergent pest / weed control; pH management; levelling; producing seed drills; method of sowing seeds **OR** digging pockets / holes; method of planting; watering / irrigating new plants / new seeds; protection of new plants / new seeds, e.g. mulching / netting; preparation specific to a named crop;	**6**
13(c)	crops being eaten by pests; crops being contaminated by pests; cost of pest control; crops rotting due to being damp; increased fungal / bacterial diseases; crops drying out due to being too hot; germination of stored seed / growth of stored crop; less crop to sell at market; poorer quality of crop for sale / crop less valuable; lower demand for crop; problem related to a specific crop;	**4**

Question	Answer	Marks
14(a)	insufficient food for the age / production level of the animal can lead to; a loss of condition; too much food can lead to; an animal putting on excess weight; insufficient nutrients / minerals / vitamins; can lead to deficiency diseases; insufficient carbohydrate / energy sources; can lead to lack of energy; insufficient protein; can lead to poor animal development / growth; insufficient food supplied; may lead to fighting for food / damage;	**4**

Question	Answer	Marks
14(b)	*1 mark for the type of record.* *1 mark for each reason for it being kept, for example:* recording when disease / pest attacks occur; so that the farmer can be ready for reoccurrence / spot patterns; knowing which animals have been given treatments for ill-health; so that animals are retreated at the correct time / are not given a second treatment / overdose; knowing the age of the animal; so appropriate care can be given according to the age of that animal; knowing if the animal is pregnant or not / when the animal became pregnant; so appropriate care can be given according to the stage in gestation; record the animal's weight / mass; so that a farmer can see if there is a problem, e.g. loss of weight through illness or parasites; record of feed given / its nutritional content; source of deficiency diseases;	**6**
14(c)	keeping breeding records helps the farmer select the best of their stock / this stock can then be used for breeding / selective breeding; keeping breeding records to identify barren stock which can then be culled; record which male animals produce the best offspring and then use them for breeding in the future; measuring growth rates in meat animals and only breeding with those with the best growth rate; keeping records of food conversion ratios and breeding those with the most efficiency; records of prices for the sale of livestock so farmer can sell when prices are highest; records of demand for particular products, e.g. lean meat / brown eggs so farmer can maximise profit by meeting that demand; records of production so that the animal can be fed to meet the needs of production / so that production does not decline; keeping production records so that the farmer can estimate and can fulfil contracts;	**5**