



Cambridge IGCSE™

AGRICULTURE

0600/11

Paper 1 Theory

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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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This document consists of **25** printed pages.

PUBLISHED**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)(i)	method of crop / livestock production; specific organic pesticides / pests controlled biologically / without (non-organic) pesticides; no synthetic / artificial fertilisers; using natural fertiliser(s) such as manure; no genetically modified organisms; antibiotics only to treat illness (not as prophylactics) / no growth hormones;	2
1(a)(ii)	<p><i>Max. 2 marks for benefits and max. 2 marks for potential problems. One mark for each benefit. One mark for each potential problem.</i></p> <p><i>benefits:</i> sustainability; environmentally friendly; lower negative impact on beneficial insects / animals; enhancement of soil structure / fertility; increased biological diversity; reduced risk to farm workers / requirement for protective gear; may have better flavour; in the long term, organic farms save energy; contributes to slower global warming; fewer pesticide / fertiliser residues in food; do not have to spend money on artificial fertiliser / synthetic pesticides; potentially less pollution; organic markets are growing very quickly;</p>	4

Question	Answer	Marks
1(a)(ii)	<p><i>potential problems:</i> organic food is more expensive; organic manures may cause smells / attract pests / insects; may need extra training / require special skill set; some organic chemical alternatives are more expensive; lower yields / slower growth; production costs can be higher; more labour is usually needed; marketing and distribution can be less efficient; organic farming unlikely to produce enough food to feed the world population; weed / pest / disease build up; potential source of infection for other crops; may require more energy to produce; you may need to be certified as an organic producer; may take time to establish organic status; may be an increased risk of illness due to microbial contamination from organic fertilisers;</p>	
1(b)	<p><i>One mark for each method explained, for example:</i></p> <p>use cultural methods of pest control to reduce production losses; (<i>Accept specific examples.</i>) use biological methods of pest control to reduce production losses; (<i>Accept specific examples.</i>) select (organic) varieties with higher yields / choose appropriate variety so that high inputs are not needed; use of compost / manure / organic fertiliser to increase the nutrient content of the soil / increase soil fertility; practice crop rotation / fallow period to allow the soil to recover; grow legumes to add nitrogen / add nutrients / make the soils more fertile; use green manures to add nutrients to the soil / improve soil health;</p>	2

Question	Answer	Marks
2(a)(i)	C;	1
2(a)(ii)	C;	1
2(b)(i)	evaporation;	1
2(b)(ii)	transpiration / evapotranspiration;	1
2(b)(iii)	heat / high temperature; (high) wind speed; (increased) light intensity; dry air / reduced / low humidity;	3
2(c)	clay soil is more easily waterlogged / clay soil warms up slowly / is cold / lakeside location / effect of water / spray;	1

Question	Answer	Marks
3(a)(i)	chlorophyll / chloroplast; light / sunlight;	2
3(a)(ii)	glucose / sugar / carbohydrate; oxygen;	2
3(b)	<i>glucose / sugar / carbohydrate:</i> used in respiration / to release energy, e.g. for active transport / growth; translocated / moved in the phloem; storage in storage organs, e.g. roots / flowers / fruits / tubers / stems / developing leaves) / converted to starch; <i>oxygen:</i> used in respiration / to release energy / released to atmosphere / diffuses / moves through stomata;	2
3(c)(i)	increases the rate of photosynthesis; which then levels off / plateaus / increases until another factor becomes rate limiting;	2
3(c)(ii)	increases the rate of photosynthesis;	1

Question	Answer	Marks
4(a)(i)	B;	1
4(a)(ii)	C;	1
4(b)	<p><i>Explanation needed for full marks.</i></p> <p>dissolved minerals travel through the xylem; with water due to transpiration pull / stream; due to positive pressure from roots (push of root gradient); due to negative pressure from leaves (pull from leaves);</p> <p>active transport; where energy is needed / minerals move against their concentration gradient;</p> <p>by capillary action; due to forces of adhesion / cohesion / surface tension;</p> <p>dissolved minerals travel by diffusion; down their concentration gradient;</p>	2

Question	Answer	Marks
4(c)	<p><i>Feature with linked explanation for 2 marks, for example:</i></p> <p>large surface area; bigger area for the process to take place;</p> <p>OR</p> <p>thin wall; reduces diffusion distance;</p> <p>OR</p> <p>has a partially permeable membrane; allows water to move across the cell;</p> <p>OR</p> <p>long / elongated shape / in contact with water; allows the root to reach water within the soil / allows osmosis to take place;</p>	2

Question	Answer	Marks
5(a)	the process by which pollen / male gamete is transferred; from an anther to a stigma / to the female parts;	2
5(b)(i)	<i>One mark for each of the following labelled correctly on the diagram.</i> anther; filament; stigma;	3
5(b)(ii)	lots of pollen; light pollen; hanging / exposed anthers / stamens; exposed tassel / stigma / style; feathery stigma provides large surface area; sticky stigma to catch the pollen;	2
5(b)(iii)	<i>For the insect pollinated plant:</i> petals are more brightly coloured; larger / heavier pollen; less pollen; pollen will be more sticky; may have nectar / scent; may have honey guides; flowers dispersed throughout plant rather than at top; male and female parts can be enclosed;	2

Question	Answer	Marks
6(a)	12.5 / 12 500; kg / g; <i>Unit must match numerical answer for the unit mark.</i> <i>Allow other correct representations.</i>	2
6(b)	<i>Explanation needed for full marks, for example:</i> general overuse of compound fertiliser can increase soil acidity / lower pH; due to release of hydrogen ions;	2
6(c)	increase soil pH / make soil more alkaline / reduce acidity / neutralises acidic soils;	1
6(d)	poor plant growth / stunting / spindly growth; pale green / yellow leaves; small leaves;	2

Question	Answer	Marks
7(a)	<p><i>One mark for each of the following labelled correctly on the diagram</i></p> <p>caecum; small intestine; stomach;</p>	3
7(b)	<p><i>large intestine:</i> water absorption / bacterial action / transports waste into rectum;</p> <p><i>liver:</i> production / excretion of bile / amino acid breakdown / enzyme production / storage of glycogen / removes toxins;</p> <p><i>small intestine:</i> further digestion / nutrient absorption, e.g. protein and fat are absorbed / receives output of stomach / contains bile to increase pH / receives the secretions of the pancreas / liver / gall bladder / emulsification / enzyme action;</p> <p><i>stomach:</i> food mixed with gastric juices / kills pathogens / churning / action of stomach acid / digestion / digestion of protein;</p>	4

Question	Answer	Marks
8(a)	<p><i>lactation:</i> (period of time) when milk is produced by an animal;</p> <p><i>weaning:</i> the time at which young animals start to take solid food / infant gets used to food other than mother's milk / no longer rely on mother for feeding;</p>	2
8(b)(i)	<p><i>One mark for each description of the feed requirements change. One mark for an appropriate explanation for one of the changes.</i></p> <p><i>changes:</i> requirement increases (later) in pregnancy; higher protein feed is needed; higher energy feed is needed; specific mineral need, e.g. calcium; may eat less food more often / higher quality food needed;</p> <p><i>explanation, e.g.:</i> to feed the growing foetus; as the developing foetus grows (and develops) more protein is needed for muscle etc.; to prepare for colostrum / milk production; as the foetus grows the mass / amount of feed the animal is able to eat is less;</p> <p><i>Allow specific animals examples if appropriately described and explained.</i></p>	3
8(b)(ii)	<p>energy requirement during lactation increases; to enable milk production; for recovery / body mass gain; to maintain body condition / get ready to mate again;</p>	2

Question	Answer	Marks
9(a)	<p><i>dominant:</i> a characteristic / gene / allele which is always expressed, even if only one copy is present / a trait that will appear in the offspring if one of the parents contributes it;</p> <p><i>heterozygous:</i> two different alleles code for a gene / characteristic;</p>	2
9(b)(i)	<p><i>genotype of parents:</i> Dd x Dd;</p> <p><i>gametes of parents:</i> D d x D d;</p> <p><i>offspring genotypes:</i> DD Dd dD dd;</p> <p><i>expected ratio given OR link between genotype and drought resistance:</i> 3 resistant (DD Dd dD) : 1 not resistant (dd);</p> <p><i>Allow ratio reversed if resistance identified correctly.</i></p>	4
9(b)(ii)	drought resistant;	1
9(c)	<p><i>One mark for a relevant characteristic and one for explanation of benefit to farmer, for example:</i></p> <p>pest resistant; reduced need for pesticide / can grow on previously infected soil;</p> <p>hardiness; can grow in harsher climates;</p> <p>appearance / colour / size / flavour; product more in demand;</p> <p>height of crop plant / dwarfing; needs less water / puts more energy into harvestable output / less likely to lodge;</p>	2

Question	Answer	Marks
10(a)	plough / dig / turn over soil; create fine tilth / seedbed; example, e.g. disc / rake; level soil; remove rocks; drain; allow fallow period; plant legumes; add manure / green manure; add pre-emergent fertiliser; graze animals on land prior to sowing, e.g. sheep; test soil pH; add lime (if required); add pesticide; remove weeds, e.g. spray / cultural methods;	5
10(b)	<p><i>Max. 4 marks for one area. Allow development / detail mark for any point.</i></p> <p><i>planting:</i> choose planting material, e.g. transplanting / seed / cuttings / tubers; timing; planting method, e.g. broadcast / planter / seed-box / germinate / propagate / soak seeds; holes / drills; sowing depth; between plant spacing; within row spacing; cover / firm in as required; watering / mulching / shading if appropriate;</p> <p><i>care:</i> appropriate example of pest control / diseases control; appropriate example of controlling weeds; further fertiliser addition; monitor / crop walks; watering / irrigation;</p>	5

Question	Answer	Marks
10(c)	<p><i>Max. 4 marks for one area.</i></p> <p><i>windy:</i> plant windbreaks / provide windbreak; plant appropriate cover crops / do not leave soil bare / plastic mulches; transplant established plants; under-sow; grow perennial varieties; plant varieties with short stems / consider dwarf varieties;</p> <p><i>dry:</i> irrigate, with suitable example described; increase soil's organic content; provide mulch; plant drought-resistant varieties; provide shade; method of water storage described;</p>	5

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Question	Answer	Marks
11(a)	<p>named piercing and sucking pest, e.g. aphid / Bagrada bug / mealy bug / scale insect; decreased growth rates / lack of vigour; takes nutrients / sucks sap; plant loses water / plant wilts; toxic saliva; transmit diseases / viruses / blight / spreads fungus; coat with 'honeydew' / reduces fungicide effectiveness; reduced photosynthesis; mottled leaves / browning / yellowing; stunted growth; curled leaves; low yield; death;</p>	4
11(b)	<p>use crop rotation to break life cycle of pest; burning / clearance to kill pest / remove diseased residue / field trash; ploughing to expose eggs or larvae; remove weeds that act as pest hosts; grow alternative crop not subject to pests / use resistant varieties to remove pest burden; use clean / certified planting material; time planting / harvest to avoid pest build up; nets / traps / hand-picking / mechanical means / washing to remove pests; strip planting / companion cropping to remove pests; use of sterile males; control using a natural enemy / predator; which feeds on / destroys pest / reduces pest population; specific example of biological control;</p>	5

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Question	Answer	Marks
11(c)	<p><i>Explanation required for each mark.</i></p> <p>may use less fertiliser so reduced costs; resistance to pests / weeds / disease so less herbicide needed / less pesticide use / lower costs; lower use of machinery / labour / fuel so costs lower; thrive in poor soil or adverse climates so can be grown successfully on more farms / so are likely to produce a crop every year; crops can be more productive / have a larger yield / bigger fruit so more to sell / bulk production / more income / profit; enhanced flavour / nutrient content so more desirable product / greater demand; faster growth rate so may be quicker to market / allow multiple crops in one year; some foods stay fresh / ripe for longer so can be shipped long distances to more markets / longer shelf life / less waste; lower losses / fewer plants die so increased profit; reduced market for the product so lower income; increased cost of seeds so higher production costs; GM seeds are generally sterile so cannot keep your own seeds to sow next year / increased input costs; unknown side effects / opinions about risks may result in less demand;</p>	6

Question	Answer	Marks
12(a)	a disease that must by law be reported; to ministry / vet; isolate sick animal / plant;	2
12(b)	<p><i>Accept suitable examples including animal specific examples, for example:</i></p> <p>hair loss; faeces contains blood / worms / faeces sticks to skin / fur / feathers; runny faeces / diarrhoea; abnormal urine, e.g. blood / dark in colour; dull coat; watery / dull / sunken eyes; patches / wounds on skin / ruffled feathers; rib cage stands out; poor stance / head down / tail between legs; cough / sneeze / nasal discharge; panting / breathing fast; dry nose (in cattle); cold ears; drooping ears (if not breed characteristic); abnormal temperature; raised pulse rate; lethargy; no appetite / will not eat; isolating itself; erratic behaviour / aggression; weight loss despite eating;</p>	7

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Question	Answer	Marks
12(c)	<p><i>Explanation required for each mark.</i></p> <p>monitor frequently / have good vigilance to identify disease early and so prevent transmission to other animals; reduce spread by direct contact by not overstocking; reduce transfer of infectious agent (microorganisms / oral secretions / lesions / spores) by minimising animal contact / licking / rubbing by isolation / quarantine of sick animals; maintain good hygiene by removing waste / faeces / urine and by regular cleaning of walls / floors / use of disinfectants / clean bedding / foot baths which can host pests / diseases; reduce pest / disease burden by vaccination; reduce spread by ingestion by ensuring clean food / water / receptacles; reduce spread through lack of handler cleanliness by providing clean protective clothing / ensuring change of clothes; example of suitable veterinary health check / treatment, e.g. iodine dip / foot bath / fly spray to reduce specific pests / diseases; reduce spread by airborne transmission by ensuring good ventilation; reduce parasites and disease spread by vectors by controlling pests / insects using fly traps / draining field, etc.;</p>	6

Question	Answer	Marks
13(a)	the amount of food needed by an animal; above / more than a maintenance ration; for growth / lactation / reproduction; to allow work or the production of products, e.g. meat / milk / eggs;	3
13(b)	suitable size, height / area / internal space; roof, example suitable materials; walls, made of material strong enough and appropriate to animal; floor, made of durable material / not damaged by hooves, etc.; door(s), large enough to allow access; door(s), strong enough to be secure; windows, suitable material and position, e.g. glass window high up; water supply, adequate delivery method for volume of water, e.g. troughs / water bowls / pipes / drinkers; ventilation, mechanical / fan / opening / closing windows to allow air circulation; designed to allow safe handling of animals, e.g. crush / race / multiple gates; method to deliver sufficient food, e.g. access to tractor / feed wagon; system to hold the right quantity of feed, e.g. troughs of suitable size / feed passage; suitable lighting for farming activities / assisting with behaviour; relevant legislation and codes of practice to be considered in design; enrichment and socialisation features; suitable waste management system;	6
13(c)	<i>One mark for each explanation, for example:</i> difficulty in cleaning / maintaining hygiene if poorly designed which leads to build up of diseases; lack of clean water if system to provide water is ineffective / overcrowded / not functional; harder to mechanise feeding (e.g. zero grazing) leads to reduced food intake / some animals not eating / malnutrition if some animals do not get to eat; poor visibility may lead to difficulty in monitoring animals therefore symptoms can be missed; poor drainage leads to disease build up, e.g. foot rot; damaged roof gives no protection from predators / protection from the elements; damaged walls / surroundings could cause harm to animals / cuts, etc. / animals escape and are hurt when escaped; lack of ventilation increases chances of airborne transmission of pests / diseases; lack of isolation facilities leads to increased disease spread;	6

Question	Answer	Marks
14(a)	<p><i>Max. marks requires both areas to be covered, for example:</i></p> <p><i>obtaining:</i> from a river; collected rain water / collect from roof; from a borehole / well; from mains supply;</p> <p><i>storage:</i> in reservoir / lake; in ditches; using a river dam; held in tanks / in a water tower; stored in a water butt / buckets;</p>	4
14(b)	<p>tank detail, e.g. up high / use of gravity; use of a pump; increased pressure; pipe systems; connection detail, e.g. pipe joining / washers / fittings; taps; ball valve; water bowls / troughs / nipple drinkers; use of ditches;</p>	5

Question	Answer	Marks
14(c)	<p><i>Both areas must be covered to award full marks.</i></p> <p><i>why water may need to be treated:</i> water may be contaminated; with poisonous materials, e.g. pesticides; may contain pathogens / parasites; these may cause disease; if water is dirty may be less palatable to animals; animals may become ill through not drinking sufficient water;</p> <p><i>description of treatment:</i> use settling technique / sedimentation; detail, e.g. use of holding tank / slowing water down;</p> <p>use precipitation technique; to bind / remove toxic elements / heavy metals / flocculant;</p> <p>use filtration technique / screen; detail, e.g. remove solids using different filter materials;</p> <p>filter through reed beds; detail, e.g. will remove most contaminated material;</p> <p>use desalination; detail, e.g. leave water to evaporate and collect;</p> <p>skim the surface to remove floating debris; detail, e.g. branches / leaves;</p> <p>use radiation / irradiate / UV light; to kill pathogens / microbes;</p>	6

Question	Answer	Marks
14(c)	use high temperature / boil / pasteurise; to kill pathogens / microbes; treat with chlorine / ozone; detail, e.g. to kill pathogens;	