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Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

AGRICULTURE **0600/13**

Paper 1 **October/November 2017**

MARK SCHEME

Maximum Mark: 100

Published

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Question	Answer	Marks
1(a)(i)	screen protects the pump / removes or filters out large objects, e.g. debris / sticks / stones / leaves / dead birds / fish / branches;	**1**
1(a)(ii)	*water at C is / has:* lighter in colour / clearer; smaller particles; less suspended materiel, e.g. soil / mud in water; water no longer smells; *ORA for water at A.*	**1**
1(a)(iii)	to remove smaller objects / less dense (soil) particles at C that remain in suspension; which cannot pass through / are removed by the filter at C; to remove clay particles;	**2**
1(a)(iv)	particles too close together / impermeable; water could not pass through / clay is waterproof; clay particles are small; would make the water cloudy;	**2**
1(a)(v)	to kill bacteria / pathogens / microbes;	**1**
1(b)	to raise water to the storage tank; higher than tank D / because the storage tank is higher than the other tanks; the pump increases the force / provides pressure / does work to lift the water; against gravity;	**2**

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Question	Answer	Marks
2(a)	*Max. 2 marks for clearing or preparing alone.* *clearing:* felling / cut down trees / ringbarking; tree removal; ground / bush clearing / use of herbicides / remove weeds; stumping / remove roots; burning; use of pigs / goats; *preparing:* cultivation; plough / dig / turn over soil; disc / rake; create seedbed; drain; add lime if required; add fertiliser if required; add pesticide if required;	**3**
2(b)	erosion; desertification; evaporation; run-off / loss of organic matter; leaching / loss of soil fertility / nutrient loss; acidic soil; soil capping / panning; loss of soil organisms;	**2**

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Question	Answer	Marks
2(c)	*Credit each explanation to answers in **(b)**. One mark per explanation.* *Accept other valid explanations.* *For example:* *erosion:* terracing / plant vegetation / mulching with plant remains / plough across or not down slope / crop rotation / drainage prevents soil being carried away; *run-off / loss of organic matter:* drainage / bunds / terracing prevent rapid flow of water directly downhill; leaching / loss of soil fertility / nutrient loss prevent soil or water flowing away, which takes dissolved nutrients; *acidic soil:* liming to raise pH / do not overgraze or over fertilise reduces hydrogen ion build up / raises pH; *soil capping / panning:* mulching / minimum cultivation / use low soil-impact machinery protects soil surface from rain / keeps soil particles separate / prevents them clumping together / maintains porosity of soil;	**2**

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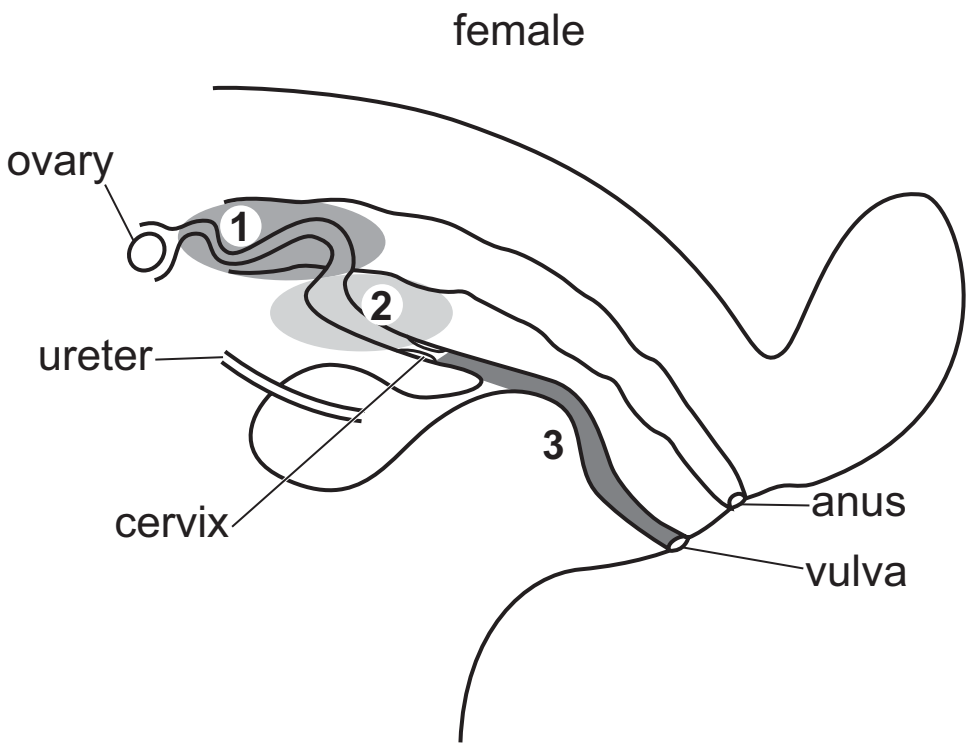
Question	Answer	Marks
3(a)	named root crop; appropriate product / use;	**2**
3(b)	*preparation of seed-bed:* create fine tilth / remove lumps / crush / levelling / lumps / treading / rolling / raking / apply herbicide / apply pesticide / apply fertiliser / apply lime / digging / ploughing / turn the soil / use cultivating equipment; *sowing or planting:* sowing method / drills / holes / pockets / ridging / earthing up / label rows / water / use of mulch / use of fertiliser / manure; *growing stage:* use of fertiliser / manure / remove / prevent / growth of weeds / control pests / monitor for disease / treat disease; *storage of harvested crop:* *Any two of:* remove water / keep dry / keep covered; lower temperature / keep cold; store away from light / in dark; maintain correct atmosphere / well ventilated; example of storage container, e.g. silo / sack; clean the storage area; clear space in storage area; kill / prevent access of vermin / keep pest-free; chemical treatment of crop, e.g. fungicide / drying agent / anti-sprouting agent; *Accept application of fertiliser / manure / lime / pesticide once at an appropriate stage.*	**5**

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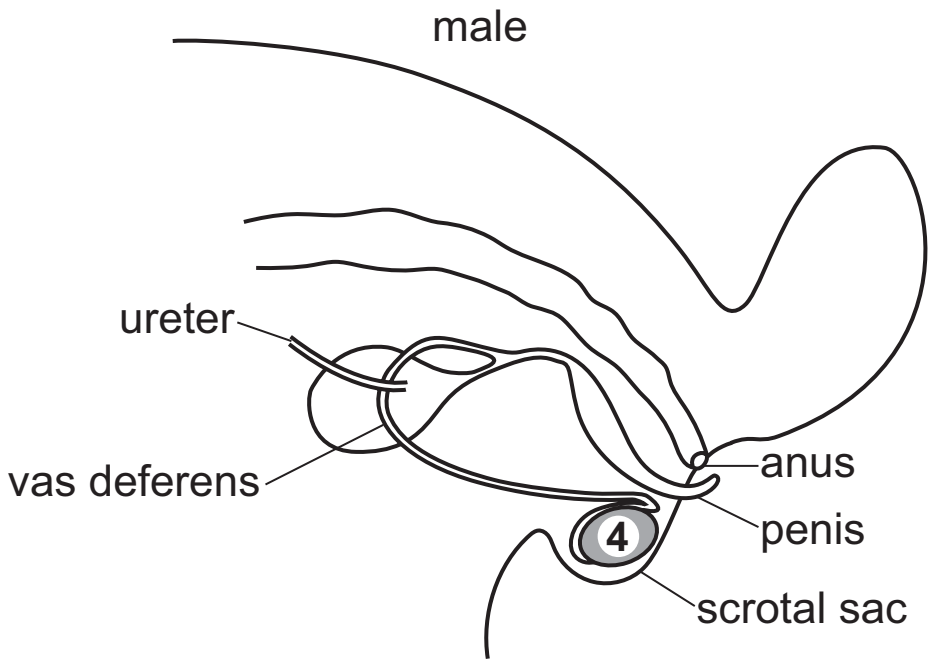
Question	Answer	Marks
4(a)	more food; health, e.g. parasite burden; better quality feed / access to better pasture; genetic factors / breed; ewe / mother's characteristics; ewe milk quality / access to colostrum; gut efficiency;	**2**
4(b)	select sheep with high / best growth rates; use these sheep to produce offspring / next generation with higher growth rates;	**2**
4(c)(i)	source of fluid; high protein / vitamins / minerals or named vitamin / mineral / contains electrolytes; reduces scouring; improves feeding efficiency; contains / provides antibodies against disease; confers immunity / resistance to diseases (animal born without immunity); provides a source of energy; clears animal's bowel / laxative; highly digestible;	**2**
4(c)(ii)	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;	**1**

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Question	Answer	Marks
5(a)(i)	*One mark for a correct location of each organ, example of acceptable zones shown for responses within 'tube' areas:* **1** for oviduct; **2** for uterus; **3** for vagina;  	**4**

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Question	Answer	Marks
5(a)(i)	**4** for testicle;  	
5(a)(ii)	egg / ovum / oestrogen / progesterone;	**1**
5(b)(i)	testicle;	**1**
5(b)(ii)	thick walls control access; secretes mucus (into the vagina); small opening softens to allow sperm through at mating / expel foetus at birth; during pregnancy is filled with thick mucus / secretion / cervical 'plug' / helps retain embryo during gestation; protects uterus from infection; *Accept reference to specific pig example – spiral grooves grip penis / penis locking.*	**1**

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Question	Answer	Marks
5(c)	sperm head enters egg; tail is lost / head enters; egg becomes impermeable; fusion of male and female gamete; zygote forms; diploid cell produced;	**3**
5(d)	age / genetic predisposition / infertility (male or female) / low sperm count / miscarriage / poor egg implantation / nutrition / timing of service / inefficient service / hormone imbalance in females / the egg has not been fertilised; *Accept other valid suggestions.*	**1**

Question	Answer	Marks
6(a)(i)	*One mark for the answer. One mark for a correct unit.* 1.67; t per ha; *Full marks for correct answer with units and to 2 d.p.*	**2**
6(a)(ii)	farm C; it has the lowest yield per hectare;	**2**
6(b)	*Award marks for descriptions of transmission via:* soil; seed; wind; insects / pests; water; weeds; plant-to-plant;	**2**

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Question	Answer	Marks
7(a)	28.5; 20.6; 7.9; *Accept ECF for profit for candidate's total value of output minus candidate's total costs.* *If a loss results a negative value must be shown for the mark.*	**3**
7(b)	vet / medicine; labour; repair of buildings; additional equipment, e.g. ventilator; transport; utilities, e.g. gas; electricity; water; oil; *(Allow 2 named examples of utilities.)*	**2**
7(c)	disease control / vaccination; parasite control, e.g. worming / drenching; avoid overstocking; regular health checks; wean at the right time / not too early; good nutrition; chosen breed suited to environment; suitable environment, e.g. ventilation if indoors; good hygiene; clean water availability; isolate sick livestock; control predators; vaccinate; *Accept good stockmanship if no examples of this given.*	**2**

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Question	Answer	Marks
8(a)	the appearance / features of an organism (resulting from inherited information / genes);	**1**
8(b)(i)	parents Hh x Hh; gametes H h x H h; offspring HH Hh Hh hh; *Allow ECF for a correct answer matching to incorrect parents or gametes.*	**3**
8(b)(ii)	C;	**1**
8(c)	*Examples may include:* *advantage:* success in attracting mate / fighting off rivals / fight off predators / knock down food / fences to access food / easier for farmers to catch; *disadvantage:* horns can be dangerous / get stuck in fences / hedges / damage to meat / skin from fighting / wound linked to horn could lead to infection / reduces number of animals that can be kept in an area / reduces number of animals that can be transported at one time / knock down farm fences;	**2**

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Question	Answer	Marks
9(a)(i)	P; lowest number of grazing animals per hectare / ha; OR largest number of hectares / ha per grazing animal;	**2**
9(a)(ii)	correct pH levels; correct nutrient levels; improve drainage; add fertiliser; control pests; grow better types of grass / herbage; rotational grazing; management to avoid overgrazing, e.g. strip grazing; zero grazing; animals individually tethered; sow with legumes; irrigate;	**2**
9(b)	forage / grass is cut / chopped; conserved for later use; food transported to the livestock / pen / shed where the livestock are housed; animals are kept indoors / in yards; animals are fed by farmer;	**2**
9(c)	overgrazing; preferred plants die out; animals receive poor diet; erosion; loss of soil nutrients; soil structure damaged, e.g. compaction / soil cap / soil pan; soil acidification; disease, e.g. increased pest / parasite burden; lower growth rates / longer time to finish animals; animal stress; pasture destruction / exhaustion;	**3**

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Question	Answer	Marks
10(a)	minimum amount of food required to keep an animal healthy / alive; animal stays in initial condition / no production / no gain or loss in mass / work done; important for maintaining stock when there is a feed shortage, e.g. during drought;	**2**
10(b)	*ruminant:* teeth are adapted for grinding; allows regurgitation of the cud; has multiple chambers in stomach / stomach has four regions; rumen; reticulum; omasum; abomasum / true stomach; *non-ruminant:* has longer large intestine; the premolars and molars are smaller; birds have no teeth; the stomach has one region / simple stomach; the volume of the stomach is relatively large; cannot regurgitate and re-chew / chew cud; some have lager caecum;	**5**

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Question	Answer	Marks
10(c)	*One mark for naming a non-ruminant.* *One mark for a function of each part.* *named non-ruminant;* *mouth / teeth / beak:* collection / pecking of food; food moistened by saliva; action of salivary enzymes; masticated / chewed by teeth; *oesophagus:* swallowing; passage of food / peristalsis; *stomach:* food mixed with gastric juices; churning; action of stomach acid; *small intestine (duodenum / ileum):* receives semi-liquid output of stomach; alkali added to increase pH; bile / pancreatic juice added (from liver / gall bladder or pancreas); bile emulsifies fats / oils; enzyme action; nutrient absorption; *large intestine / colon:* bacterial action; water absorption; transports waste into rectum; *rectum:* stores waste material / secretions / bacteria; passed out / egested;	**8**

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Question	Answer	Marks
11(a)	air is 78% nitrogen; cannot be directly absorbed by plants; movement of N through environment; nitrogen fixation; by bacteria / rhizobium; root nodules; action of lightning; nitrogen from decay of organic material / dung / urine; produces ammonium compounds / ammonification; action of nitrifying bacteria / nitrification; production of nitrites and then nitrates; nitrate absorption by plants; nitrogen used for protein production; animals consume plant material; action of denitrifying bacteria / denitrification;	**5**
11(b)	more than one (major) nutrient per addition; can provide known / targeted nutrients; consistent amounts / application; can be slow release; different compounds for different crops / fields; by increasing the NPK levels of the soil as needed; risk of soil acidity; reduction in soil microbes; some may add no organic matter, qualified; soil structure may deteriorate;	**4**

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Question	Answer	Marks
11(c)	*Max. 4 marks for legumes or organic fertilisers alone.* *legumes:* root nodules of legumes can fix nitrogen not available to plants; this is carried out by nitrogen-fixing bacteria / Rhizobium; plant decays releasing N into soil; nitrogen is incorporated into soil; avoids nutrient depletion; *organic fertilisers:* provide nitrogen (also P and K depending upon source); contain trace minerals; can improve soil crumb structure; can add humus which improves soil structure; can improve drainage or water retention dependent on soil type; can improve mineral retention; reduces soil erosion; some add organic matter or bulk to the soil;	**6**

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Question	Answer	Marks
12(a)	*One mark for naming a biting and chewing crop pest.* e.g. (grass)hoppers / locusts / termites / leaf miners / beetles; crop destroyed / eaten; crop may fall down; leaves / stems removed; loss of photosynthetic tissue; less sugar / carbohydrate made; less growth / lower yield; wilt / water loss; site of disease entry;	**4**
12(b)	*cultural / mechanical methods:* crop rotation; early planting; collect by hand / pick off; use nets to protect; reduce breeding sites / remove trash and field waste; burning; companion planting; planting a crop which is toxic to the pest; use resistant varieties; sticky traps; *biological methods:* introduce a predator; example of predator and prey; eats / preys on / kills pest; sterile males; pheromone traps;	**5**

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Question	Answer	Marks
12(c)	*inputs lowered:* reduced costs; less fertiliser needed; less herbicide needed; less pesticide use; resistance to pests, weeds and / or disease; use of machinery / labour / fuel costs lower; thrive in poor soil or adverse climates; *outputs increased:* more income / profit; may produce more desirable product; more to sell / bulk production; quickly to market when demand is high; less waste; crops can be more productive / have a larger yield / bigger fruit; faster growth rate; foods stay fresh / ripe for longer so they can be shipped long distances to more markets; longer shelf life; can have enhanced flavour / nutrient content; lower losses;	**6**

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Question	Answer	Marks
13(a)	enables zero grazing; animal damage to ground reduced; maximise forage yield; increased forage quality; less risk of contaminated feed; controlled feeding; easier to mechanise feeding; easier animal management / husbandry; can manage different fields / areas differently;	**6**
13(b)	tank detail, e.g. up high; increase pressure; pipe systems / taps; ball valve; water bowl; trough; nipple drinker; connection detail, e.g. pipe joining;	**3**
13(c)	lack of the benefits of natural sunlight; named issue, e.g. vitamin D deficiency / ringworm; good hygiene is more difficult because animals are closer together; waste management issue created; building maintenance / usage cost; is more costly than keeping outdoors; feed cost increased due to increase use of brought in food; costs of transporting food; additional labour requirements, e.g. cleaning; cost of welfare regulations; pollution issues, e.g. smells; pollution in run-off; health issues; aggression / fighting / stress-related issues; higher disease risk; easier disease transmission between animals; negative impacts on animal's feet;	**6**

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Question	Answer	Marks
14(a)	*Accept similar arguments if used in context of treatment on animals rather than plants.* *systemic pesticide:* accept an example of a systemic pesticide; can be sprayed anywhere on the plant; absorbed through the surfaces of leaves / stems / roots / seed; pesticide moves to other parts of the plant; carried internally to all parts through the phloem sap of plants; affects pests feeding on any part of a plant; pest ingests chemical; pest dies; *contact pesticide:* accept an example of a contact pesticide; have to reach their target directly, e.g. make contact with the pest; absorbed a short distance through the external body surface or exposed tissue of the pest; are not carried around inside the plant; must touch target pest to be effective / relies on contact rather than ingestion; a thorough application of a contact pesticide is more important than with a systemic pesticide; often less effective (often fails if the insect pest lives below leaves or in tight locations of the flower or nodes for example); less effective on pests with protective parts;	**4**

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Question	Answer	Marks
14(b)	*Max. 3 marks for either storage or usage alone.* *storage:* not near food store; not near settlements; not near drains / water courses; not near flammable material; dry and cool room; well-ventilated room; fire-resistant door; security, e.g. locked away; warning signage; leakage retention; store powders above liquids; visible products / good lighting; *usage:* do not spray when windy; do not spray near water courses / on rainy day / allow to be washed away; do not use near food; no eating / drinking / smoking when using; safe disposal of containers / contaminated clothing after use; do not wash out sprayer in stream; maintain equipment; protective clothing / gloves / mask; correct dilution / mixing; operator should wash after use;	**5**

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Question	Answer	Marks
14(c)	*Accept reverse arguments for chemical methods.* *advantages of biological methods:* cost effective as one application can control pests for an extended period; cost effective as less expensive equipment required; cost effective as less labour needed to apply; usage is not dependent on weather, do not have to wait for a suitable day to spray; if sufficiently targeted may have no effect on crops; tend to be pest specific, does not kill beneficial insects; crop is organic so may have higher value / desirability; safe for the user as toxic chemicals are not used / no side effects; safe for the consumer as toxic chemicals do not enter the food chain; *disadvantages of biological methods:* more labour needed for monitoring and identifying pests, increases costs; some biological control methods are costly, increased costs; some are not as effective on a field scale as in a controlled environment; may need multiple types of biological control methods for multiple pests; there may not be an effective biological control solution for some pests; need to control release time carefully, e.g. at correct point in life cycle; results may be slower to achieve; the use of biological methods limits the possible use of pesticides to control other pests; some biological control methods become damaging to the environment, e.g. introduce invasive species or damage other crops;	**6**

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