
AGRICULTURE

5038/12

Paper 1

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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.

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Question	Answer	Marks
1(a)(i)	hygienic; durable, against water / wind for example; secure, harder to dig through for escape / predators / theft; fire resistant;	1
1(a)(ii)	good insulation; allows air to circulate; warmer in winter / cooler in summer; locally available; (<i>Accept only once.</i>) low cost;	1
1(a)(iii)	no specialist equipment needed; quick to install; locally available; (<i>Accept only once.</i>) easy to replace when needed; very cost effective / cheap; liquid waste drains away;	1
1(b)	cost; rust / corrosion; blow off in high winds; not locally available; too cold in cool months / too warm in warm months; condensation; noisy when it is raining;	2

Question	Answer	Marks
1(c)	<p><i>Explanation is required for full marks.</i></p> <p>concrete is hard / flat / impervious; therefore is easier to clean / sweep / disinfect / more hygienic / saves time; does not harbour pests; more durable against running water for example; more secure (harder to dig through for escape / predators / theft); stronger / does not break easily; makes building multiple use, e.g. to store feed / equipment; cools the building; keeps animals / birds inside / predators out; does not become waterlogged / tread up / get muddy;</p> <p><i>Accept reverse arguments.</i></p>	2

Question	Answer	Marks
2(a)(i)	<p>14 – 6 = 8 kg gained 320 – 56 = 264 days <i>(both required for 1 mark);</i></p> <p>8 / 264 = 0.030; (allow 30.30 as below) <i>(Credit 1 mark for value. Allow ECF.)</i></p> <p>kg per day / g per day to match value; <i>(Credit 1 mark for correct unit.)</i></p> <p><i>Full marks for correct answer with its correct unit.</i></p>	3

Question	Answer	Marks
2(a)(ii)	food conversion ratio; mortality (rate); (concentrate) food intake; feed costs; vet costs; labour; example of relevant variable cost; example of relevant fixed cost; output / income / profit; price per kg / annual fluctuation in market / abattoir / store prices; milk production; breeding records, e.g. birth rate; health records, e.g. vaccination records;	3
2(b)	period of time when milk is produced by an animal;	1

Question	Answer	Marks
3(a)(i)	<i>Accept any correct example of a fungal plant disease.</i> e.g. damping off / mildew / rice blast / rust / wilt / rots / blight / blotch / smut / ergot; <i>Accept a correctly named fungal pathogen, e.g. Botrytis / Armillaria / Phytophthora / Fusarium / Verticillium etc.</i>	1

Question	Answer	Marks
3(a)(ii)	<p><i>Allow specific or general effects.</i></p> <p>reduced yield; damage stem / leaves; wilting; stunting / reduced growth; defoliation; yellowing / discolouration of leaves; marginal necrosis; reduced photosynthesis / photosynthetic tissue; damaged / mouldy / rotten fruit; produce toxins / bad smells; plant dies; clogged vascular tissues / prevent uptake / translocation of nutrients;</p>	3

Question	Answer	Marks
3(b)	<p>fungicides / pesticide; kills fungus on growing or mature plants and fruits;</p> <p>seed treatment; know seed is fungus free – reduces fungal burden in crop;</p> <p>soak seeds in hot water to kill spores; reduces fungal burden in crop;</p> <p>use certified seeds; know seed is fungus free, reduces fungal burden in crop;</p> <p>use resistant varieties; crop is not affected by fungal disease;</p> <p>transplant healthy seedlings; know seedlings are fungus-free – reduces fungal burden in crop;</p> <p>crop rotation; disrupt pathogen life cycle / avoid disease;</p> <p>good hygiene / cleanliness; use clean tools / machinery / cultivation; removes disease spores from crop; remove crop residues / plant debris / affected plant parts;</p> <p>remove diseased and dead / yellow leaves; prevents disease being harboured / slows growth of fungi;</p> <p>use atmospheric solutions (create warm, dry, fresh conditions); low humidity reduces fungal spread;</p> <p>enough space between plants / create air movement if indoors; low humidity / density of plants slows fungal spread;</p>	4

Question	Answer	Marks
3(b)	<p>grow plant in area less suited to fungal disease; lower frequency of fungal disease;</p> <p>early planting; plant is established before fungus takes effect;</p> <p><i>Accept relevant biological control, e.g. use of fungus which attacks pathogenic fungi.</i></p>	

Question	Answer	Marks
4(a)(i)	X on the diagram anywhere in the vagina;	1
4(a)(ii)	sigmoid flexure straightens / grows in size / becomes longer / larger / swells / becomes erect / hard / stiffens;	1
4(a)(iii)	<p>to make them quieter;</p> <p>less vicious / less dangerous;</p> <p>easier to handle / easier to harness;</p> <p>to remove a diseased organ;</p> <p>to prevent transmission of sexual diseases;</p> <p>to control mating / only the best bulls breed / cannot mate ;</p> <p>gain mass / grow more quickly;</p> <p>animals less stressed / to stop males fighting;</p> <p>meat is better / has better fat distribution / meat is not tainted;</p>	2

Question	Answer	Marks
4(b)	<p><i>Award 1 mark for each completely corrected section.</i></p> <p><i>the day before birth:</i> udder swells / becomes larger / fills with milk; vulva swells; pin bones widen; mother feels baby moving; mother isolates itself / becomes restless / nervous; (<i>Accept animal specific behaviours.</i>) vaginal discharge / lubrication; pelvis relaxes;</p> <p><i>at birth:</i> cervix dilates; waters break; vaginal discharge; pushes / strains; has contractions;</p> <p><i>shortly after birth (mother):</i> mother licks calf; mother feeds calf; umbilical cord breaks; mother passes after-birth / cleansing / placenta; mother may eat placenta;</p> <p><i>shortly after birth (offspring):</i> offspring starts to breathe; offspring tries to stand up; offspring finds teats / suckles; offspring drinks; drinks colostrum / first milk;</p>	4

Question	Answer	Marks
4(c)	<p><i>Explanation required for full marks.</i></p> <p>crushing; calf gets stuck / takes a long time to come out; need to pull harder / cannot get calf out; lungs fill with fluid; could suffocate; delayed labour; cord stuck around calf's neck when going backwards;</p>	2

Question	Answer	Marks
5(a)(i)	<p>B, C, D, A labelled clockwise from top of the diagram.</p> <p><i>4 correct for 2 marks. 2 correct or 3 correct for 1 mark.</i></p>	2
5(a)(ii)	<p><i>Credit one mark for each stage and one mark for a reason.</i></p> <p>B / egg; D / pupa;</p> <p>they do not eat / bore into / transmit disease to the crop / no mouthparts;</p> <p><i>Allow ECF based on candidate's answers to (a)(i).</i></p>	3
5(b)(i)	<p><i>Correctly named piercing and sucking pest for 1 mark.</i> e.g. aphids, bagrada bugs, mealy bugs, scale insects, leafhoppers, thrips etc.;</p> <p><i>Credit 1 mark for an example of relevant damage.</i> e.g. decreased growth rates / disease introduced / impact of disease, e.g. mottled leaves / wilting / low yields / lack of vigour / crop death / stunted growth / curled leaves / loss of sap / suck sap / juice / loss of nutrients / virus vector / fungal coating of plants, e.g. from honeydew;</p> <p><i>Allow ECF for correct damage given for an incorrect pest.</i></p>	2

Question	Answer	Marks
5(b)(ii)	cultural example, e.g. pests removed / crop rotation / companion planting / time of planting / biological control example, e.g. predator-prey; spray with chemicals, e.g. pesticides / insecticides / named example; genetic control, e.g. sterile males;	1

Question	Answer	Marks
6(a)	balanced / consistent diet / ration; gives a varied diet / variety of nutrients / vitamins / trace elements; easier ration management; maximise animal performance; improved feeding efficiency; can take advantage of seasonal / cheap food sources; reduces labour / time to feed; improved digestibility; improved palatability / flavour; reduced risk rumen upset / acidosis; provides fibre to aid gut movement / prevent constipation;	3
6(b)	cost per 1 kg gain = 0.04×8 ; = \$0.32; cost per 5 kg gain = \$1.60; <i>(Allow ECF for 5 × any worked cost for 1 mark.)</i> <i>Full marks for correct answer.</i>	3
6(c)(i)	more labour / time; more processing; more fuel / transport; storage;	2

Question	Answer	Marks
6(c)(ii)	cheaper than disposal as waste; to reduce feed costs / feed buying costs; to meet a specific feed requirement; to take advantage of seasonal / local resources; variety; palatability;	1
6(d)	<i>ruminant:</i> can digest grass / can digest cellulose / more material; gut microbes can make protein / essential amino acids; gut microbes can synthesise vitamins (B and K); less energy lost as digestion process more efficient; can chew cud, allowing greater extraction of nutrients; absorption in rumen (and other stomachs) as well as intestines; <i>ORA for non-ruminant.</i>	2

Question	Answer	Marks
7(a)(i)	parents Rr x rr; gametes r r; offspring Rr Rr; phenotype smooth smooth; <i>Allow ECF.</i>	4
7(a)(ii)	<i>heterozygous:</i> an individual has one each of two different alleles / has different alleles; <i>phenotype:</i> the appearance / features of an organism (resulting from inherited information / genes);	2

Question	Answer	Marks
7(b)	D;	1
7(c)	select cultivars with suitable characteristics; cross these to produce offspring / next generation with improved characteristics; select again for suitable characteristics until cultivar breeds true; over many generations;	2

Question	Answer	Marks
8(a)(i)	phosphorus;	1
8(a)(ii)	B;	1
8(b)(i)	liming; add an alkali / named alkali;	1
8(b)(ii)	because acidity can vary over time; to allow maximise nutrient availability; to know how much lime / alkali to add for optimum crop growth; agricultural processes, e.g. irrigation / fertiliser application can change pH;	1
8(b)(iii)	to find a reliable (field) average / to find a reliable average for a specific area / to understand the different acidity of different areas / to be able to differentiate liming / fertiliser application / to be able to map the field for acidity;	1

Question	Answer	Marks
9(a)	method of growing plants using mineral / nutrient solutions; in water; without soil; roots in the nutrient solution only / or in an inert medium, such as perlite or gravel;	2

Question	Answer	Marks
9(b)(i)	less space required / more space for another crop; more automation possible; increase productivity / yield; better quality of product; constant supply of nutrients; do not need to use scarce land / soil; fewer pests and diseases; it allows crops to be grown in regions where there is no soil; shorter growing cycle;	2
9(b)(ii)	high setup costs; specialist equipment needed; skilled staff needed; supply of water needed; electricity needed; not suitable for all crops; some plants have to be supported; ease of disease spreading;	1

Question	Answer	Marks
10(a)	movement of synthesised food; sugar / sucrose / nutrients transported; made in photosynthesis; dissolved in water; from leaves; to storage organs / other tissues; through (living) phloem cells; active transport; needs energy (from respiration); carbohydrate stores (complex);	4

Question	Answer	Marks
10(b)	photosynthesis; synthesis of carbohydrates / glucose; mainly in leaves / palisade cells; carbon dioxide and water used; chlorophyll / chloroplasts; light / energy required;	5
10(c)	mineral ions are dissolved in soil water; through the roots; root hairs increase surface area for absorption of soil water; water / nutrients enter through root hair cell; osmosis; active transport; ion exchange; travel through the xylem to where required in the plant; concentration gradient ref. explained; symbiotic relationships, e.g. fungi to enhance root surface area; positive pressure from roots (push of root gradient); negative pressure from leaves (pull of leaf gradient); transpiration pull / stream;	6

Question	Answer	Marks
11(a)	abnormal temperature; lethargy; hair loss / rough coat; abnormal faeces / blood / worms / very runny / sticks to fur / feathers; dark / blood urine; no appetite / will not eat; watery / dull / sunken eyes; weight loss despite eating; rib cage stands out; isolated; poor stance / head down / drooping; cough / sneeze / nasal discharge; panting / breathing fast; dry / runny nose; erratic behaviour / aggression; visual parasites;	5

Question	Answer	Marks
11(b)	<p><i>Max. 3 marks for either how disease is transferred or how it is avoided alone.</i></p> <p><i>Allow a development mark / an example for detail in either section.</i></p> <p><i>direct contact – transfer of microorganisms through:</i> oral secretions; lesions; spores; licking; rubbing;</p> <p><i>indirect contact:</i> contaminated food; contaminated water; dirty walls; dirty troughs; droplet contact; airborne transmission; faecal transmission; through vectors;</p> <p><i>avoidance:</i> good hygiene, e.g. regular cleaning of walls / floors / disinfectants / clean bedding; foot baths; good drainage; vaccination; quarantine / movement restrictions; identify and treat sick animals; regular health checks on animals; isolation of sick animals; dispose of dead animals hygienically; correct feeding; fencing / barrier to other farms; avoid stagnant pools / places where microbes / mosquitos could breed; handler cleanliness / protective clothing / change clothes; dips;</p>	4

Question	Answer	Marks
11(c)	<p><i>Allow an example disease used in explanations for one mark.</i></p> <p>damage organ function, e.g. liver fluke; low growth rate; reduced eating; animal more susceptible to other illnesses / bring diseases; irritation; lack of coat quality; damage product; death; take host's food; reduced growth rates / later finishing / mass loss; less saleable; lower output / income / profit; increased vet / medicine costs; increased feed costs;</p>	6

Question	Answer	Marks
12(a)	<p>the process by which pollen is transferred; from the anther; to the stigma; of the same species; by wind / by insects;</p>	3

Question	Answer	Marks
12(b)	<p><i>Maximum of 4 marks for structure or function alone.</i></p> <p><i>structure:</i> lots of pollen / light pollen; no nectar; exposed / hanging stamens; long filament / hanging anther; small flowers / petals; dull / green / brown flowers; tall;</p> <p><i>function:</i> adapted for wind pollination;</p> <p><i>male:</i> pollen is light to be carried by the wind; produces large volumes of pollen because wind pollination is random; pollen is released easily by wind movement;</p> <p><i>female:</i> stigma / style / silk hang outside to collect pollen easily;</p>	6

Question	Answer	Marks
12(c)	<p><i>asexual:</i> one parent / single organism; no gametes; vegetative reproduction; no flowers / pollen / pollination / fertilisation; genetically identical offspring; mitosis; cloning; example of method, e.g. cutting / grafting / layering / bulbs / suckers / crowns / corms / rhizomes / stolons; example of crop, e.g. banana / sugar cane / yams;</p> <p><i>sexual:</i> flowers; male sex cells – pollen (nuclei); female sex cells – ovules; pollination / fertilisation; fusion of (male and female) gametes; must meet for reproduction;</p> <p><i>Accept reverse arguments.</i></p>	6

Question	Answer	Marks
13(a)	<p><i>No mark for crop. Actions must be appropriate to crop choice. Max. 2 marks for each section.</i></p> <p><i>preparation:</i> choose crop to suit conditions; choose planting material; plough / dig / turn the soil; timing; raking; cultivation detail – soil tilth / seed-bed / ridges and / or furrows; fertiliser; pesticide; manure;</p> <p><i>sowing or planting:</i> broadcast / planter / drill / seed-box / germinate / propagate / soak seeds; sowing depth; between plant spacing; within row spacing; watering; cuttings / tubers;</p> <p><i>growing on:</i> control pests; control diseases; control weeds; fertiliser application; monitor / crop walks; watering / irrigation; harvesting;</p>	4

Question	Answer	Marks
13(b)	<p><i>Credit 1 mark for weed example.</i></p> <p><i>harmful effects:</i> reduce yield; compete for water; compete for nutrients; compete for light; compete for space; increase cost of production; reduce quality / contaminate produce; toxic / harmful to crop / consumer; harbour pests / insects / diseases; block waterways; reduce value of land; faster wear and tear of farm implements;</p> <p><i>how spread:</i> wind; water; animals; people;</p>	5

Question	Answer	Marks
13(c)	<p><i>Allow any 6 points:</i></p> <p>clear the soil of existing weeds before planting crop; weeding regularly helps prevent weed spreading;</p> <p><i>cultural methods:</i> break life cycle; e.g. rotation; intercropping; under sowing; fast-growing varieties; removing crop residues; flooding; timely planting; timing of harvest; mulching / covering soil;</p> <p><i>mechanical methods:</i> e.g. harrow / hoe / cut; pull up; ridge / plough in / remove rhizome from soil; burning;</p> <p><i>chemical methods:</i> spraying herbicide / named chemical; weed wipe; contact; systemic;</p>	6

Question	Answer	Marks
14(a)	small particles; slow to warm up; small air spaces / poorly aerated; poor drainage; good water-holding capacity; not easily leached; not easily eroded; hard to cultivate / heavy / sticky soil; lots of nutrients; cracks when dry; prone to waterlogging; may contain few / fewer rocks / pebbles;	4
14(b)	minimum tillage; reduce compaction; sub soiling; reduce salinity / soil pans; do not over water; effective drainage; avoid monoculture; do not cultivate when soil is wet; low pressure tyres; avoid overstocking / do not let animals poach the ground / avoid bottlenecks; plough before frosts; increase humus / organic matter; use green manures; lime to raise pH / reduce acidity; avoid mixing top and subsoil;	6

Question	Answer	Marks
14(c)	affects water availability, high temperatures cause increased evaporation / transpiration; low temperatures reduce availability of liquid water / frozen water cannot be absorbed; affects rate of photosynthesis through effect on enzyme-catalysed reactions; required temperatures for flowering / growth for certain species, which affects crop quality; temperature affects soil microbes impacting nutrient availability and soil structure; slower uptake of nutrients by roots; freezing causes ice crystals which damage cells; seedlings more vulnerable to extremes of temperature; seedling germination is triggered at certain temperatures for some species; plants can wilt due to water stress;	5