

**MARK SCHEME for the October/November 2015 series**

**5038 AGRICULTURE**

**5038/12**

Paper 1, maximum raw mark 100

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 will not enter into discussions about these mark schemes.

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Mark schemes may use these abbreviations:

- ; = separates marking points
- / = alternative and acceptable answers for the same marking point
- ( ) = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark
- e.c.f. = error carried forward
- o.r.a. = or reverse argument

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- 1 (a) D; [1]
- (b) (i) two mould boards rather than one (and a share); [1]
- (ii) A – used for turning soil over/primary cultivation; [2]  
B – used for ridging/making bed for suitable named crop;
- (iii) clean/wash; [2]  
oil blades;  
grease (moving parts);  
store in dry place;  
store in a safe space;  
sharpen;
- [Total: 6]**
- 2 (a) dig ditches/drainage channels/drain it; [2]  
lay pipes;  
pump and sluice (gates)/windmills;  
build dykes;  
build ridges/protective wall;  
plant marsh plants to build up soil;
- (b) (i) *Allow one mark for each reason.*  
*Any option can be chosen with valid reasons linked to the characteristics of the land, e.g.*
- aquaculture: access to water; existing habitats;  
cereal production: high levels of fertility following flooding; flat land; cereals need large amounts of water/irrigation; room to turn machines;  
forestry: trees will lower water table due to water uptake by roots; wind break;  
livestock grazing: fresh grass; livestock not harmed by light flooding; [2]
- (ii) aquaculture: water might flood so fish escape/water too still/pests/predators;  
cereal production: soil water table high/lack of air for roots/fertiliser leaching;  
forestry: ground not stable for tree roots/site exposed;  
livestock grazing: poach land as it is inclined to flood; soil water table is high/land too wet for grass growth; get foot rot/other water-related diseases; [3]
- [Total: 7]**
- 3 (a) (i) A: plumule; [2]  
B: radicle;
- (ii) X: food/energy store; [1]
- (b) planting where – into seed bed/type of soil; greenhouse/eq.; [3]  
when – appropriate to area with reasons;  
how – preparation; scatter seedlings/rows/drill/plant/seed rate;  
spacing – appropriate depth and distance between seeds/rows;

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- (c) (i) variety (of crop bred with specific features); [1]  
(ii)  $F_1$  not true / pure breeding / may not give expected features; [1]

[Total: 8]

4 (a) A; [1]

- (b) (i) action of roots or shoots / secretion of chemicals; [1]  
(ii) trampling / action of urine / burrowing; [1]

- (c) (i) (root) nodules; [1]  
(ii) nodules have bacteria / Rhizobium;  
fix nitrogen;  
nitrogen compounds released on death / decay of plant; [2]

- (d) soil that supports good growth of a crop / plant;  
well-aerated / drained;  
high in nutrients; [2]

[Total: 8]

5 (a) they improve the soil structure; [1]

- (b) (i) organic have trace elements, inorganic do not;  
organic have less N P K than inorganic;  
organic are lower in K; [2]

(ii) 0.5(%); [1]

- (iii) the (ratio / proportion / percentage) of N P K / nitrogen phosphorus potassium in the fertiliser; [1]

- (c) can make soil more acidic;  
can disrupt ion exchange;  
causes water loss from roots;  
pollution qualified; detail;  
leaching; overgrowth of weeds / clogged waterways; too many nutrients in the water;  
eutrophication; [2]

[Total: 7]

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- 6 (a) (i) A; [1]
- (ii) C; [1]
- (iii) B; [1]
- (b) *lines between:*  
 concentrate = high in nutrients  
 roughage = high in fibre  
 succulent = high in moisture
- Three correct for two marks.  
 One or two correct for one mark.* [2]
- (c) (i) tubers are bulk foods / provide carbohydrates / fill animals up; [1]
- (ii) seeds are high in protein / provides nutrients for growth and production; [1]
- (d) fibre provides cellulose for fermentation in ruminant / can digest fibre /  
 develops the rumen / source of energy;  
 aids gut movement / avoids constipation in non-ruminant; [2]
- [Total: 9]**
- 7 (a) insect / nematode;  
 blight / damping off / mildew / rust / rot / mould / blackleg / smut / allow appropriate disease;  
 mosaic / rosette / allow appropriate disease;
- Accept animal or plant examples.* [3]
- (b) named insect vector, e.g. aphid;  
 virus spreads when feeding on sap / plant juices from different plants; [2]
- Allow non-plant examples.*
- (c) (i) C; [1]
- (ii) D; [1]
- (d) crop rotation;  
 early planting;  
 burning old crop / remove crop residue / diseased crop;  
 using new / clean or certified / resistant seed;  
 barriers; [2]
- [Total: 9]**

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- 8 (a) C; [1]
- (b) X in oviduct, beyond cervix; [1]
- (c) (i) Same letter used AND capital for lop ear allele and lowercase for prick ear allele.  
*Reject two letters for one allele.* [1]
- (ii) AA x aa; Aa; [2]
- (d) (i) breed only prick eared with prick eared / aa x aa /  
selectively breed prick-eared pigs; [1]
- (ii) lop could be Aa or AA / you cannot tell by looking if a lop-eared pig is homozygous or heterozygous; so it takes generations to obtain only AA / to achieve purity using back cross; [1]
- [Total: 7]**
- 9 (a) roof: state material, relate to insulation / ventilation;  
wall: state material, relate to insulation / ventilation;  
windows: glass / automatic opening / light levels;  
floor: concrete prevents damp rising / can be insulated / wood on supports gives improved insulation / under-floor heating;  
*Allow temperature or ease of cleaning for one mark each.* [2]
- (b) (i) spread of disease;  
sores on feet;  
stress / boredom;  
overheating;  
suffocation;  
animal-to-animal injury / fighting / scratching / pecking;  
feather loss by rubbing on bars; [2]
- (ii) lack of movement plus ad lib food gives weight gain;  
cost more because more food eaten / wasted through boredom; [1]
- (c) (i) C; [1]
- (ii) costs less for hens fed on mash because their food intake is lower / cost per 100 eggs is lower;  
egg production is higher / egg mass is higher; [2]
- (iii) no – there is no large difference in figures; [1]
- [Total: 9]**

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**10 (a)** *fence type*: post and rail; wire fence; gate; droppers for wire fence;  
*construction*: stronger post for corner / gate; tensioning; detail of fence; depth of post in ground; concrete base; supporting posts at an angle; preservation detail; method of tensioning;  
*dimensions*: suitable height described; spacing of rails; barbed wire location explained;  
*(Allow reference to gate construction for two marks.)* [10]

**(b)** *Allow suitable comments.*  
e.g., durability;  
maintenance;  
availability of material;  
effectiveness related to large animals, e.g. strength of material;  
enclosing feature / barbed wire;  
cost qualified;  
labour / skill / time / requirement qualified;  
temporary or permanent fence considered; [5]

**[Total: 15]**

**11 (a)** competition for water;  
competition for space;  
competition for light;  
competition for minerals / nutrients;  
harbour pests;  
harbour diseases;  
contaminate crop;  
interfere with harvesting process; [6]

**(b)** *mechanical*:  
hoeing / by hand / machine;  
detail – method described;  
result – roots exposed / weed cut or removed;  
burning or composting;

*chemical*:  
herbicide spray / contact herbicide;  
selective or non-selective;  
systemic;  
detail – method of application, e.g. sprayer;  
timing;  
not in high wind / rain;

*Maximum of four marks on either mechanical or chemical.* [6]

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(c) *To award marks a comparison must be made.*

comparison re: labour; tools/equipment; impact on weeds;

e.g. mechanical – high labour costs;  
some tools are cheap;  
less impact on some weeds;

e.g. chemical – cost of chemicals high;  
needs skilled labour/training;  
sprayers expensive;  
very effective;

[3]

**[Total: 15]**

**12 (a)** *diagram to show:*  
mouth/teeth;  
gullet/oesophagus;  
sphincter – cardiac or pyloric;  
stomach;  
liver;  
gall bladder;  
pancreas;  
duodenum;  
ileum/small intestine;  
caecum/appendix;  
colon/large intestine;  
rectum;  
anus;

[9]

**(b)** *microorganisms:*  
break down cellulose/fibre; named microorganism;  
active in rumen;  
fatty acids produced for immediate absorption; detail;  
microorganisms are digested to release nutrients;

*enzymes:*  
active in saliva;  
abomasum/small intestine;  
break down large molecules to smaller ones;  
food made soluble for absorption;  
named example;

*Maximum of four marks on any one of microorganisms and enzymes.*

[6]

**[Total: 15]**

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- 13 (a) (i)** water movement up plant;  
in xylem;  
negative pressure from leaves;  
due to evaporation from leaves;  
positive pressure from roots;  
due to osmosis;  
capillary action; [5]
- (ii)** water out by diffusion; high to low concentration of vapour;  
via thin cuticle/stoma; controlled by guard cells;  
detail – open when turgid; light/temperature dependent;  
diffusion/evaporation accelerated by wind/heat;  
loss from intercellular spaces;  
replaced from other cells;  
outer cells become more concentrated; osmotic gradient/pressure; [7]
- (b)** transport;  
of minerals/nutrients;  
cooling;  
supplies water (to leaves) for photosynthesis;  
aids turgidity/prevents wilting; [3]

**[Total: 15]**

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- 14 (a) *sampling:*  
method;  
tool used, e.g. auger;  
depth (not at immediate surface);  
mixing detail;  
repeats; detail of repeats, e.g. depth and location;  
use of GPS;

*test:*  
remove contaminants;  
mix with water;  
add barium sulphate / 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;  
colour / probe-reading detail;

*Maximum of five marks for either part.*

[9]

- (b) lime is alkaline;  
makes soil pH higher / more alkaline / pH 7–8;  
most crops grow well in pH 6.5–7.5;  
at alkaline pH more minerals available;  
encourages bacterial activity / earthworms;  
this in turn aids humus formation and aeration;  
breaks up clay / flocculation to aid drainage in heavy soil;

[6]

**[Total: 15]**