

## First variant Mark Scheme

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- 1 (a) *assume answer is about plant cells unless told otherwise, allow reverse argument*

(large / sap) vacuole ; **A** 'animal cell has small vacuoles' **R** sap unqualified  
 chloroplasts ; **R** chlorophyll  
 (cellulose) cell wall ;  
 starch grain(s) ; **R** starch unqualified

[max. 2]

- (b) (i) **B ;**  
**E ;**  
**F ;**  
**A ;**  
**D ;**

[5]

- (ii) *award two marks if correct answer (x 990 to 1010) is given, ignore units*

*ecf – award one mark if incorrect measurement or 10 cm is divided by 0.1*  
*if answer is correct put two ticks on answer*  
*if answer is incorrect but the denominator is 0.1, place a tick on the working*

100 / 0.1 ; **A** 99 - 101  
 = (x) 1000 ; **A** 990 - 1010

[2]

- (c) *do not award the function mark unless the cell name is correct*

(animal cell) red blood cell / erythrocyte ;  
 (function) transports, oxygen / carbon dioxide ; *haemoglobin is neutral*

**either**

(plant cell) xylem (cell / vessel) ;  
 (function) transports, water / minerals / named mineral / AW ; **A** provides support

**or**

(plant cell) phloem (cell) ; **A** sieve tube **R** companion cell  
 (function) transports, sugars / sucrose / amino acids / minerals / AW ;  
*ignore water* **R** glucose / nutrients

[4]

**[Total: 13]**

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- 2 (a) (i) accept other valid responses – must be long-term and not behavioural / social
- 1 liver, damage / failure / disease / cirrhosis ; **R** destroys **A** hardens
  - 2 brain damage / loss of brain cells / loss of neurones / loss of memory / AW ;
  - 3 cancer of correct named part of body ;  
mouth / pharynx / oesophagus / gut / pancreas / liver / breast
  - 4 stomach ulcers ;
  - 5 heart disease / stroke / AW ;
  - 6 high blood pressure / hypertension ;
  - 7 alcoholism / addiction / dependence / tolerance ;
  - 8 (risk of) damage, to fetus / pregnant woman's baby / fetal alcohol syndrome / AW ;  
e.g. low birth weight / poor mental development
  - 9 increased risk of miscarriage ;
  - 10 malnutrition / named deficiency disease(s) ;
  - 11 obesity / weight gain ;
  - 12 loss in weight / wasting ; [max. 2]
- (ii)  $(500 \times 2 =) 1000 \text{ (cm}^3\text{)} ;$  [1]
- (b) (i) (nutrients are) large molecules / need to be small molecules ;  
**A** complex / simple, molecules  
(some nutrients are) insoluble / need to be soluble ;  
must pass through, intestine wall / capillary wall ;  
**R** ref. to absorption unqualified by wall(s) [max. 2]
- (ii) small intestine / ileum / villi ; **A** duodenum [1]
- (iii) fatty acids / glycerol / maltose / peptides / AW ; **R** fat / lactose / sucrose [1]
- (c) (i) (x) 9.0 (%) ; [1]
- (ii) as blood alcohol content of blood increases, so does risk of accident / AW ;  
relevant comment on part of graph ;  
use of figures ;  
little increase in risk up to, 0.05 / 0.075, g 100 cm<sup>-3</sup>  
greater increase in risk above, 0.05 / 0.075, g 100 cm<sup>-3</sup>  
comparative use of figures – must use figures from both axes [max. 2]
- (iii) 1 depressant ;  
2 slows down nerve impulses ; **R** 'signals' / 'messages'  
3 slows down / increases, reaction / response, time(s) ;  
**A** ref to reflexes **R** reaction time decreases  
4 e.g. for stimulus or response – traffic lights / braking / swerving / stopping / AW ;  
5 blurred / double / impaired / poor, vision AW ;  
6 poor / lack of, co-ordination / AW ; **A** dizziness  
7 overconfidence / poor decision making / memory impaired ;  
8 poor judgment (of distances) ;  
9 sleep / drowsiness / less conscious / AW ;  
10 poor concentration / less aware ; [max. 3]

**[Total: 13]**

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- 3 (a) (i) fur / hair / whiskers / vibrissae ; **A** teat / nipple / breast / AW  
external ears / pinna(e) ; **A** ear flaps [max. 1]
- (ii) internal development / young develops in uterus / 'gives birth to live young' / AW ;  
sweat glands ;  
feeding of young with milk / breast feeding ;  
mammary glands / breasts / nipples ; **R** if given in (i)  
four types of teeth / named teeth (incisors, canines and molars) ; **A** two sets of teeth  
three, bones in (middle) ear / ossicles ;  
diaphragm ;  
red blood cells without nuclei ;  
neocortex ;  
seven neck vertebrae ;  
external testes ;  
dentary / single bone forming lower jaw / secondary palate ; [max. 1]
- (b) (i) (light conditions) bright / AW ;  
(explanation) narrow / small, pupils ; **A** enlarged iris [2]
- (ii) *answer must be linked with answer given in (i)*  
less light enters eyes / prevents too much light entering eyes ;  
receptors / retina / rods / cones / light sensitive cells, protected from damage / AW;  
**R** 'damage to eyes'  
*allow ecf if (b)(i) incorrect*  
more light enters eyes ;  
enough light to stimulate, retina / rods / cones ; [2]
- (c) ref. to, no cones present / only rods ; **R** 'many rods' **R** no, yellow spot / fovea [1]
- (d) ref to image (of zebras) on, fovea / retina ; **R** 'picture'  
ciliary body / ciliary muscles, relax ; **R** 'cilia muscle'  
suspensory ligament(s) becomes taut / AW e.g. 'pulled' ; **R** 'contract', 'stretched'  
lens is, made thin(ner) / less convex / flat(ter) / AW ; *ignore* long  
less refraction of light ; **A** bending, correct ref to focal length  
  
**R** if answer implies that the iris is responsible for shape of lens  
**R** change in iris for depth of field (would not change in this bright light) [max. 3]
- (e) maintains natural habitat / AW ; e.g. prevent, human interference / development  
prevention of extinction ;  
less, hunting / poaching / killing / AW ;  
tourism / economic reason ;  
maintain (bio)diversity ;  
maintain, gene, pool / diversity ; **A** ref to source of genes / alleles  
maintain, food chains / balanced ecosystems ;  
available for scientific study / AW ;  
retain for future generations / AW ; e.g. aesthetic value  
**R** any aspect(s) of management of reserves [max. 3]

**[Total: 13]**

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## 4 (a) (i)

process	materials moved	source of materials in the plant	sink for materials in the plant
transpiration	water + (mineral) salts / AW ; <b>A</b> ions / minerals / named ion <b>R</b> nutrients	roots / root hairs ;	leaves / shoot / stem ; <b>A</b> flowers / fruits named, cell(s) / tissue(s)
translocation	<i>two from</i> sugars / sucrose amino acids ions / minerals / AW hormones / named hormone; <b>R</b> glucose <b>R</b> nutrients	leaves / (named) storage organ / seed(s) / cotyledon ;	roots / stem / shoot / named growing region / (named) storage organ ; <b>A</b> buds / flowers / fruits / tubers  <b>A</b> named cell(s) / tissue(s)

[6]

(ii) *answer needs to make clear which structures are source and sink*

during germination / AW, (source is) seed / cotyledon ;  
*idea that* leaves grow and start to photosynthesise (so become source) ;

leaves may, be shed / die / be shaded / AW ;  
 leaves may stop photosynthesising (so become sink) / AW ; **A** 'slow down'

(in early growth) root (is sink) ;  
 (later) flowers / fruits / seeds / tubers / AW (become sinks) ;

[max. 2]

**[Total: 8]**

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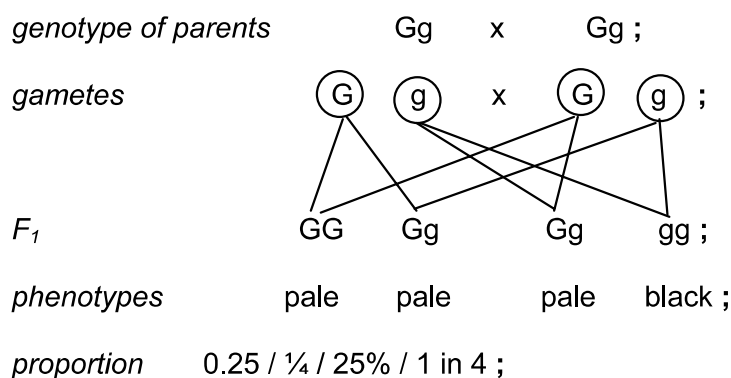
- 5 (a) (i) *accept converse argument*  
(more) black moths eaten (by, predators / consumers) ;  
  
(because) black moths, are not camouflaged / do not 'blend in' / AW ; [max. 1]
- (ii) **either**  
more black moths would be caught ; **A** numerical answer – see Table 5.1  
  
black moths have better camouflage / AW ;  
  
*accept converse argument*  
  
**or**  
less of both varieties recaptured ;  
  
death due to the pollution ; [max. 2]
- (b) (i) (first heading) phenotype ;  
(second heading) genotype ; [2]
- (ii) (dominant wing colour) pale / speckled ; **A** white [1]  
  
(explanation)  
  
(pale / speckled) appears when,  
the dominant allele / **G**, is present ;  
in, heterozygous / **Gg** (moths) ;  
  
*accept* black only appears when, homozygous / **gg** / AW ; [max. 1]
- (c) 1 discontinuous variation ;  
2 (wing colour determined by) a, gene / few genes ; **A** ref to alleles  
3 black is recessive / pale is dominant ;  
4 explanation of inheritance ; *must include ref. to, terms / genotypes*  
(black) inherited when parents are, homozygous recessive / **gg**, or heterozygous  
(pale) inherited when only one parent has, dominant allele / **G** / AW ;  
5 ref to, sexual reproduction / meiosis ; **A** mating / breeding / fertilisation [max. 3]

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(d)

- accept other letters
- ignore any row headings in candidate answers
- answer may be given with a Punnett square
- gametes may be accepted in the Punnett square even if not labelled as such
- gametes do not have to be circled
- accept contents of Punnett square as  $F_1$  genotypes
- allow ecf if incorrect parental genotypes but only for gametes and  $F_1$  to max 2
- allow ecf if no genotype for parent and gametes are wrong – allow  $F_1$  and phenotype to max 2

put ticks and crosses in a column on right hand side of answer



lines must be correct for  $F_1$  genotype mark

**A** 1 black to 3 pale but **(R)** 1 in 3 or 3:1 [5]

(e) (i) mutation ; [1]

(ii) UV light / (ionising) radiation / X rays / (named radioactive) chemical(s) ;  
**A** nuclear fall out [max. 1]

**[Total: 17]**

## First variant Mark Scheme

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- 6 (a) *idea that* gene(s) are transferred ; **A** genetic information / DNA **R** chromosome  
from one, species / organism, to another, species / organism ; [2]

- (b) DNA / RNA / nucleic acid ; [1]

- (c) (i) testosterone ; **R** spellings with 'oge' [1]

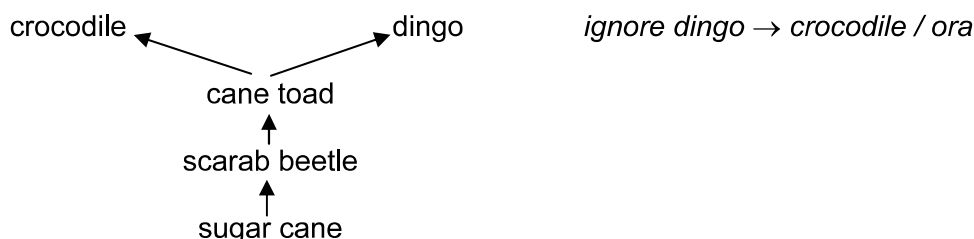
- (ii) voice will break / AW ;  
hair on, chest / face / under arms / in pubic area / around sex organs ;  
shoulders broaden ;  
muscle develops ;  
penis enlarges ;  
testes / scrotum, enlarge ; } **A** genitals, grow / enlarge  
produce, sperm / seminal fluid / AW ;  
named behavioural change ; [max. 2]

*put ticks and  
crosses in a  
column on  
right hand  
side of  
answer*

- (d) (i) (x axis) time / years / months ;  
(y axis) number of toads / number of individuals / population / AW ;  
**R** 'toads' unqualified **A** 'amount of toads'  
S shaped curve ;  
exponential / log, phase labelled on straight part of curve (bracket or line) ; [4]

- (ii) (lack of) food / prey ; **A** fewer scarab beetles  
ref. to habitat change or damage ;  
change in temperature / global warming ;  
ref. to pollution ;  
(bacterial) disease / parasite ;  
(lack of) breeding places ;  
shortage of water / drought ; [max. 1]

- (e) (i) *ignore references to virus*



- i. arrows must point from food to feeder (even if incorrect organisms) ;  
ii. all five organisms included in correct order with lines even if no arrows ;  
**A** if more organisms included [2]

- (ii) *no other answers are acceptable*  
(carnivore) cane toad + dingo + crocodile ;  
(herbivore) scarab beetle ;  
(producer) sugar cane ; [3]

**[Total: 16]**