

## MARK SCHEME for the October/November 2013 series

### 5090 BIOLOGY

5090/22

Paper 2 (Theory), maximum raw mark 80

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.

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1 (a) (i) vein; [1]

(ii) valve; [1]

(b) a valve shown with flaps touching;

vessel widest at correct side of valve + walls shown both before and after valve; [2]

(c) (vein) empty / no blood flowing through;

blood has been pushed out of (vein);

\* blood cannot flow back (due to valve / from B);

\* finger on the right / at D + prevents blood flowing;

walls of vein thin thus not visible beneath skin **AW**; [max 4]

(d) muscle + contraction(s);

increase blood pressure;

increases circulation / blood flow / helps fill (vein) with blood; [2]

**[Total 10]**

Page 3	Mark Scheme	Syllabus	Paper
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- 2 (a) damage / breaks **AW** (cells / tuber);  
 ref. cell wall / membrane;  
 releasing (cell) contents / starch;  
 kills cells / denatures enzymes / stops metabolic reactions; [max 2]
- (b) amylase / carbohydrase;  
 digests / breaks down / hydrolyses + starch;  
 (to) maltose; [3]
- (c) (i) fermentation / anaerobic respiration; [1]  
*left hand side of equation*  
 glucose /  $C_6H_{12}O_6$ ;  
*right hand side of equation*  
 $2C_2H_5OH + 2CO_2$  / alcohol/ethanol + carbon dioxide; [2]
- (ii) fungus / yeast ; [1]
- (d) yeast (cells) + reproduce / increase in number / multiply;  
 (sediment contains) yeast (cells) / bacteria / chewed tuber **AW**  
 yeast (cells) dead + sugar / food used up / alcohol is toxic **AW**; [max 2]

[Total 11]

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- 3 (a) (i)** (cell 4) - root hair;  
 (cell 5) - sperm(atozoon) / male gamete; [2]
- (ii)** (root hair) increases surface area;  
 (for) absorption / movement (A correct named method of molecular transport) into **AW**;  
 minerals / ions / salts (or named);  
 water;  
 oxygen;  
 (cell wall) gives mechanical support / allows turgor; [max 3]
- (b)** cell 1 (RBC) – **F**;  
 cell 2 (WBC) – **K**;  
 cell 3 (palisade) – **G**;  
 cell 5 (sperm) – **J**;  
 cell 6 (spongy) – **H** ; [5]

**[Total 10]**

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4 (a) for photosynthesis / to make food/carbohydrate/starch/ glucose/sugar; [1]

(b) \* limited nitrates / nitrates not topped up;

limited protein production;

\* limited magnesium + for chlorophyll;

limited carbon dioxide ;

limited photosynthesis / limited production of food/ carbohydrate/starch/glucose/sugar;

limited space / volume / area; [max 3]

(c) ref. respiration + photosynthesis (occurring in jar);

respiration + releases CO<sub>2</sub>;

CO<sub>2</sub> + used for photosynthesis;

photosynthesis + releases O<sub>2</sub>;

O<sub>2</sub> + used for respiration;

ref. microorganisms / bacteria / fungi / decomposers + in soil; [max 4]

(d) water from leaves/transpiration **AW** / water from soil evaporates;

respiration + produces/releases water;

\*returned to soil / condenses;

\*absorbed **AW** / used by plants; [max 3]

**[Total 11]**

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5 (a) food web / food chain / ecosystem / community; [1]

(b) natural selection;

white animals better suited to environment **AW**;

white not removed/eaten / black removed/eaten **AW**;

(more) white reproduce / (less) black reproduce;

ref. allele / gene + inherited / passed on;

white become more common / black become less common; [max 3]

(c) (i) gene mutation;

chromosome mutation;

codominance; [max 2]

(ii) better adapted (to new condition) / example of better adaptation;

protection against hawk/predator / less eaten; [max 2]

**[Total 8]**

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6 (a) loss of water;

involves evaporation / as vapour;

to the atmosphere / surroundings;

cooling effect;

through pores **AW**;

in epidermis;

both affected by temp / humidity / wind (speed);

[max 3]

(b) (Accept reverse arguments where relevant)

occurs in animals;

sweating ref. (loss of) urea / ions / salts / minerals;

under nervous control;

ref. homeostasis / determined by body temperature;

(sweat) glands / ducts;

sweat extracted from blood;

(from) skin;

transpiration from leaves / stems;

(helps to) bring ions up stem/xylem / to leaves/cells;

(helps to) bring water up stem/xylem / to leaves/cells;

consequence of stomata open for photosynthesis;

[max 7]

**[Total 10]**

<b>Page 8</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
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7 (a) CO<sub>2</sub>/ water;

from body **AW**;

waste product / toxic material;

respiration;

metabolic (process);

[max 3]

(b) homeostasis / osmoregulation;

salts / ions / minerals / urea;

water;

from blood;

ref. reabsorption into blood;

in varying quantities / excess;

depending on food/water intake;

and on loss in sweating;

tissue fluid therefore at constant concentration;

water would otherwise enter or leave cells;

osmosis / diffusion;

effect on cell appearance (e.g. swell / burst / shrink);

affect on enzyme action / metabolism;

[max 7]

**[Total 10]**



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8 (a) contains female gamete / female nucleus / egg cell;

in ovary;

fertilized / fuse;

(by the) male gamete / male nucleus;

(to form) zygote / embryo;

surrounded by integuments/testa;

seed + germinates (to form new plant);

[max 4]

(b) produces haploid;

ovum / egg;

fertilization + ref. zygote/embryo;

oestrogen;

progesterone;

*any two* functions of oestrogen (e.g. devpt. of sex organs / secondary sexual characteristics / thickening of uterus lining / stimulates production of LH);;

*any two* function of progesterone (maintains uterus lining / inhibits FSH / inhibits LH AW);;

[max 6]

**[Total 10]**

<b>Page 10</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
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- 9 (a) screening blood;
- being HIV tested / contact tracing;
- avoidance of needle/syringe sharing;
- needle exchange schemes / sterilising needles;
- condoms / femidoms;
- limited partners / no intercourse with prostitutes (who may have multiple partners);
- abstinence;
- ref. education (about how HIV is spread);
- take drugs / follow treatment prescribed (to prevent spread within body); [max 4]

- (b) mosquito (vector);
- removal of breeding ground **AW** ...
- +  
drain swamps / prevent stagnation of water **AW**;
- kills eggs / larvae / pupae ...
- +  
*any two of* add insecticide to water / oil on water / put fish/bacteria into ponds;;
- bite prevention ...
- +  
*any two of* sleep under nets / screens on windows / wear long-sleeved clothes / insect repellent;;
- discourage (mosquito) ...
- +  
*any two of* insect repellent / paint walls white / wear light clothing;;
- insecticide/pesticide / coils in houses + to kill;
- release irradiated males + infertile eggs laid ; [max 6]

**[Total 10]**