**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

# MARK SCHEME for the May/June 2014 series

# 0610 BIOLOGY

**0610/32**          Paper 3 (Extended), maximum raw mark 80

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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| | | Answer | Marks | Guidance for Examiners |
|---|---|---|---|---|
| 1 | (a) | **V** – lag (phase) ; <br> **W** – log phase / exponential (phase) ; <br> **X** – stationary / plateau (phase) ; | [3] | |
| | (b) | temperature ; <br> pH ; <br> oxygen concentration ; <br> consistency / turbidity / density ; | max [2] | |
| | (c) | *(Penicillium)* has no (individual) cells / has hyphae ; <br> measuring mass is easier (compared with counting) ; <br> measuring mass is more accurate / valid (compared with counting) ; | max [1] | |
| | | | [Total:6] | |
| 2 | (a) (i) | **A** – oviduct ; <br> **B** – ovulation ; <br> **C** – zygote ; | [3] | |
| | (ii) | follicle stimulating hormone / FSH ; <br> luteinising hormone / LH ; | [2] | |
| | (iii) | 1  flagellum / 'tail', for swimming / movement ; <br> 2  small / streamlined shape, for (efficient) swimming ; <br> 3  mitochondria, for providing energy ; <br> 4  acrosome / (packet of) enzymes, for digestion of (follicle) cells / to reach ovum ; <br> 5  haploid nucleus to fuse with egg (nucleus) ; <br> 6  nucleus, to transfer genetic information to zygote ; | max [3] | **R** produce / create / forms energy AW , |

| | | | | | |
|---|---|---|---|---|---|
| **(b)** | **1** | maintain / increase, population **;** | | | |
| | **2** | allows variation **;** | | | |
| | **3** | (variation) caused by meiosis **;** | | | |
| | **4** | for example through crossing over / independent assortment **;** | | | |
| | **5** | random fusion of gametes **;** | | | |
| | **6** | ability to express recessive traits / AW **;** | | | |
| | | | | | |
| | **7** | adaptation to <u>new</u> / <u>changed</u> environments **;** | | | |
| | **8** | (allows) natural selection / evolution / formation of new species **;** | max [5] | | |
| | | | **[Total:13]** | | |
| **3** **(a)** | **1** | diffusion / osmosis / move, from cell (to air space) **;** | | | |
| | **2** | (water moves) through cell wall / membrane **;** | | | |
| | **3** | evaporates into the air spaces (inside the leaf) **;** | | | |
| | **4** | water <u>vapour</u> moves out through the stomata **;** | | | |
| | **5** | (vapour) <u>diffuses</u> (through stomata) **;** | | | |
| | **6** | <u>transpiration</u> **;** | max [4] | | |
| **(b)** | **1** | water moves through the xylem **;** | | | |
| | **2** | <u>transpiration pull</u> **;** | | | |
| | **3** | water column under tension / negative / less, pressure (in leaves) **;** | | | |
| | **4** | cohesive forces between water molecules **;** | | | |
| | **5** | lowers water <u>potential</u> / water <u>potential</u> gradient from root to leaves **;** | | **Ignore** water concentration | |
| | **6** | adhesive forces between water molecules and xylem (wall) **;** | max [4] | | |
| **(c)** | **1** | <u>osmosis</u> **;** | | | |
| | **2** | down a <u>water potential</u> gradient **;** | | **Ignore** water concentration | |
| | **3** | into the root hairs **;** | | | |
| | **4** | through a partially permeable membrane **;** | max [3] | | |

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| | | | | |
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| **(d)** | **1** | filtration / screening to remove large pieces of waste **;** | | |
| | **2** | flocculation / coagulation to separate suspended particles from water / sedimentation to settle particles **;** | | |
| | **3** | digestion by, bacteria / fungi / decomposers / microorganisms **;** | | |
| | **4** | with aeration (tank) / trickle filter / activated sludge **;** | | |
| | **5** | sludge treated with <u>anaerobic</u> decomposers / <u>anaerobic</u> digestion **;** | | |
| | **6** | (water) treated with, chlorine / ozone / UV (light) **;** | | |
| | **7** | distillation / collection of water from evaporator **;** | max [3] | |
| **(e)** | **1** | kill <u>other</u> plants that are not weeds **;** | | |
| | **2** | harms, insect / animals **;** | | |
| | **3** | bioaccumulation / AW **;** | | |
| | **4** | loss of biodiversity / destroy habitat **;** | | |
| | **5** | run off into, streams / rivers / lakes **;** | | |
| | **6** | selects for herbicide, resistance / tolerance **;** | | |
| | **7** | weeds become more difficult to control / AW **;** | max [3] | |
| | | | **[Total:17]** | |
| **4 (a) (i)** | | urea / hydrogencarbonate (ions) **;** | [1] | Mark first response on each line<br>**A** lactic acid |
| **(ii)** | | fibrinogen / insulin **;** | [1] | Mark first response on each line |
| **(b) (i)** | | <u>anaerobic respiration</u> **;**<br><u>oxygen debt</u> / vigorous exercise <u>with insufficient oxygen supply</u> **;** | [max 1] | |
| **(ii)** | | (blood) clotting **;**<br>converted into fibrin to form a mesh **;** | [1] | |

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| | | | |
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| (iii) | *any two from*<br>dilation of pupils **;**<br>reduced blood flow through, digestive system / skin **;**<br><u>increase</u> in, blood pressure or heart rate / pulse / stroke volume **;**<br>increase in breathing rate;<br>increase in oxygen concentration in the blood **;**<br>increase in glycogen converted to glucose **;**<br>increase in glucose / sugar concentration in the blood **;**<br>increase in respiration rate **;**<br>increase in blood flow through the muscles **;**<br>increase in awareness / anxiety / alertness **;**<br>broncho-dilation / widen airways **;** | max [2] | |
| (c) | **1**   (liver cells respond) to insulin if blood glucose is high **;**<br>**2**   (enzymes / liver cells) conversion of glucose to <u>glycogen</u> **;**<br>**3**   glycogen is stored (in the liver) **;**<br>**4**   (liver cells respond) to <u>glucagon</u> if blood glucose is low **;**<br>**5**   (enzymes) break down <u>glycogen</u> to glucose **;**<br>**6**   ref to, homeostasis / negative feedback **;** | max [3] | **Reject** reference of insulin / glucagon production in liver |
| (d)   (i) | $$\frac{3500 - 1300}{1300} \times 100$$<br><br>169 (%) **;;** | [2] | |
| (ii) | **1**   <u>nonspecific</u> immune response **;**<br>**2**   engulf / ingest / AW, bacteria / pathogens / dead cells **; A** phagocytosis<br>**3**   into vacuole **;**<br>**4**   use enzymes **;**<br>**5**   to digest bacteria / pathogens **;**<br>**6**   identify antigen / pathogens, for <u>lymphocytes</u> **;** | max [3] | **Reject** destroy disease |

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| | | | | | |
|---|---|---|---|---|---|
| | (iii) | **1** recognition tissue is foreign / AW ;<br>**2** ref to antigens ;<br>**3** lymphocytes release antibodies ;<br>**4** phagocytes / lymphocytes, cause tissue destruction ; | max [3] | |
| | | | **[Total: 17]** | |
| 5 (a) | | **1** <u>peristalsis</u> ;<br>**2** circular muscles contract (to push to food) ;<br>**3** muscle contraction <u>above</u> food pushes it forward ;<br>**4** circular and longitudinal muscles work antagonistically / AW ; | max [2] | |
| (b) (i) | | **P** – epithelium / epithelial cell ;<br><br><br>**Q** – (blood) capillary ;<br>**R** – lacteal / lymphatic vessel ; | [3] | **Reject** <u>ciliated</u> epithelium, epidermis, goblet cell<br>**Accept** epithelium with brush border |
| (ii) | | hepatic portal (vein) ; | [1] | |
| (iii) | | give a large surface area (of membrane) ;<br>to increase / maximise, absorption ;<br>by diffusion / by active transport ; | max [2] | |
| (iv) | | enzymes / proteases / lipases ;<br>(stomach) acid ;<br>physical damage / AW ;<br>parasites / (named) pathogens / toxins ; | max [2] | |
| | | | **[Total:10]** | |

| 6 | (a) | 1 | antennae ; | | |
|---|---|---|---|---|---|
| | | 2 | elongated bodies ; | | |
| | | 3 | segmented body / many segments ; | | |
| | | 4 | many (⩾10) legs ; | | |
| | | 5 | (one or two pairs of) legs on each segment ; | | |
| | | 6 | exoskeleton ; | | |
| | | 7 | jointed legs ; | max [3] | |
| | (b) | 1 | length of antennae ; | | |
| | | 2 | number of sections on antennae ; | | |
| | | 3 | presence / absence, of tail pieces / AW ; | | |
| | | 4 | length of tail pieces ; | | |
| | | 5 | length of legs ; | | |
| | | 6 | number of leg joints ; | | |
| | | 7 | total number of legs ; | | |
| | | 8 | position of legs on body ; | | |
| | | 9 | number of legs per segment ; | | |
| | | 10 | size / shape of segments ; | | |
| | | 11 | number of body segments ; | | |
| | | 12 | length of body ; | | |
| | | 13 | head shape ; | | |
| | | 14 | presence / absence 'spots / markings' ; | max [3] | |

| (c) | (i) | nucleus **;** | [1] | **Ignore** chromosomes |
|---|---|---|---|---|
| | (ii) | **1** *idea that* animals are identified <u>accurately</u> **; R** identify unqualified<br>**2** barcoding is, cheap / easy / quick / efficient **;**<br>**3** barcoding is useful if distinguishing characteristics / dichotomous key are difficult **;**<br>**4** identify previously unknown species **;**<br>**5** helps to identify, threatened / endangered species **;** | max [2] | |
| | (iii) | **1** ref to genes **;**<br>**2** codes for (specific) proteins **;**<br>**3** <u>stores</u> genetic information **;**<br>**4** can be <u>copied</u> to pass on information to new cells **;** | max [2] | |
| (d) | (i) | **1** <u>all</u> arrows point from food to feeder **;**<br>**2** millipedes eat dead leaves <u>and</u> fungi **;**<br>**3** food chain : bacteria → nematodes → springtails → centipedes **;**<br>**4** centipedes eat millipedes, springtails and earthworms **;** | [4] | |
| | (ii) | **1** ref to, respiration / decomposition **;**<br>**2** release <u>carbon dioxide</u> **;**<br>**3** carbon dioxide is taken in by, plants / photosynthesis **;** | max [2] | |
| | | | **[Total:17]** | |