**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 0610 BIOLOGY

**0610/21** Paper 2 (Core 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 must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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**General notes**

Do not exceed the section sub-totals or question maxima.

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

MP mark point – used in guidance notes when referring to numbered marking points

ORA or reverse argument / reasoning

OWTTE or words to that effect

A accept – as a correct response

R reject – this is marked with a cross and any following correct statements do not gain any marks

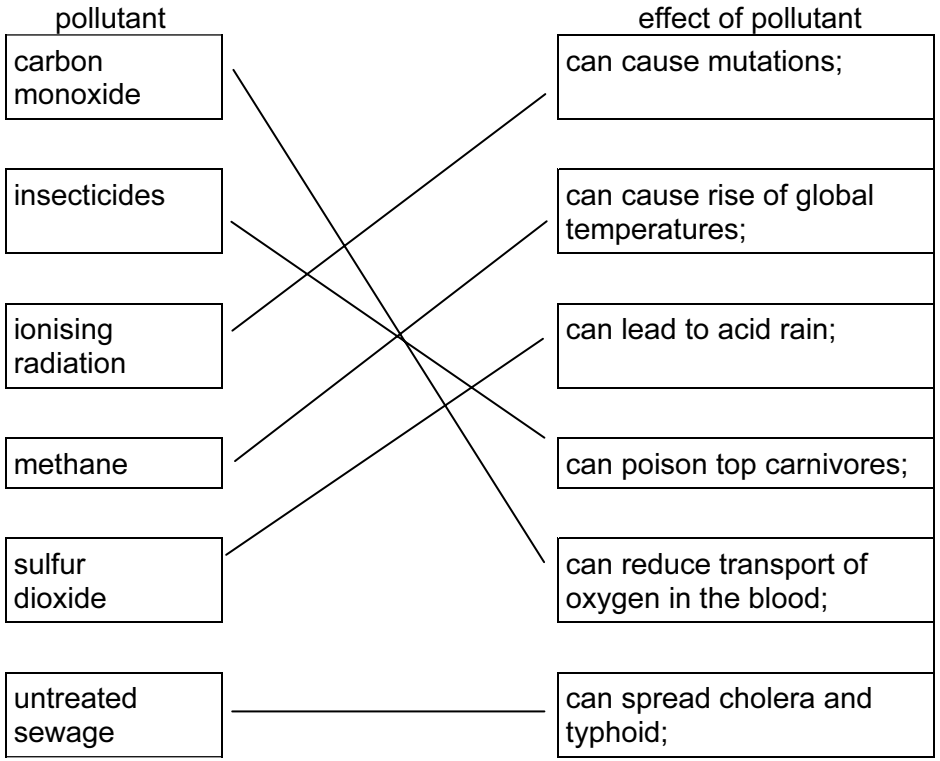
I ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.

( ) the word / phrase in brackets is not required to gain marks but sets the context of the response for credit.
e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.

<u>mitosis</u> underlined words – this word only

| | | |
|---|---|---|
| **1** | **(a)** **(i)** respiration; [1] | |
| | **(ii)** sensitivity / irritability; [1] | |
| | **(iii)** nutrition; [1] | |
| | **(iv)** excretion; [1] | |
| | **(b)** reproduction / growth; [1] | |
| | **[Total: 5]** | |

**2**




[6]

If more than one line from any pollutant then no mark for that pollutant.

**(b) (i)** (cigarette / tobacco) smoking / vehicle / car exhausts / incomplete combustion; [1]

A – ref to (faulty) gas heaters / exhaust

**(ii)** combustion / burning (of suitable material) / respiration / decomposition; [1]

**(iii)** nuclear fallout / use of X rays / exposure to UV light; [1]

A – ref to nuclear power stations / nuclear weapons / radio-therapy

**[Total: 9]**

| | | |
|---|---|---|
| **3** **(a)** | 1 the movement of molecules;<br>2 from a (region of) higher to a (region of) lower concentration;<br>3 this movement is random;<br><br>any two – 1 mark each [max 2] | 1 A – particles, ions, atoms<br>2 A – refs to down concentration gradient |
| **(b)** **(i)** | 1 any 4 points plotted accurately;<br>2 remaining 4 points plotted accurately;<br>3 line of best fit drawn and labelled; [3] | |
| **(ii)** | sample **C**; [1] | |
| **(iii)** | 1 sample **B** (was most concentrated);<br>2 as the rate of diffusion was fastest / OWTTE; [2] | |
| **(c)** | only water molecules move in osmosis / OWTTE;<br><br>a partially permeable membrane is needed for osmosis; [2] | A – selectively / semi permeable membrane |
| | **[Total: 10]** | |

| | | |
|---|---|---|
| **4** **(a)** **(i)** | **M** – site of implantation / development / protection of fetus / development of placenta / OWTTE;<br><br>**N** – transfer of ovum to uterus / site of fertilisation; [2] | |
| **(ii)** | **O** – produces / releases ova / egg (cells) / female gametes;<br><br>produces oestrogen;<br><br>produces progesterone;<br><br>any two – 1 mark each [2] | A – female hormones for 1 mark only |
| **(b)** | 1 uterine lining / endometrium shed;<br>2 lost with blood / (unfertilised) ovum;<br>3 ovum matures within ovary;<br>4 uterine lining re-grows / thickens;<br>5 ovulation occurs;<br>6 blood capillaries grow in lining;<br>7 uterine lining starts to breakdown;<br><br>any four – 1 mark each [max 4] | Response can start at any point of the cycle.<br>Points in correct sequence.<br><br>1 R – ref to uterus / uterine wall shed |
| **(c)** | 1 sperm enters / joins / fuses with ovum;<br>2 two nuclei fuse;<br>3 forms zygote / diploid cell;<br><br>any two – 1 mark each [max 2] | |

| | |
|---|---|
| **(d) (i)** oestrogen; [1]<br><br>**(ii)** 1 development of mammary glands / breasts;<br>2 widening of hips;<br>3 (growth of) pubic / axillary hair / OWTTE;<br>4 deposits of subcutaneous fat;<br><br>any two – 1 mark each [max 2]<br><br>**[Total: 13]** | I – ref to menstrual cycle / formation / release of ova |

| | | | |
|---|---|---|---|
| **5** | **(a)** *correct structure labelled*<br><br>1 sweat gland / sweat duct;<br>2 capillaries;<br>3 hair (follicle) / erector muscle;<br>4 temperature / hot / cold receptor / sensor;<br>5 fatty / adipose tissue;<br><br>any three – 1 mark each [max 3] | | If **more** than three labels then ignore other skin structures. If one label is incorrect (unrelated to the skin e.g. alveolus) – max 2, if two incorrect – max 1, if three incorrect – 0 |
| | **(b)** *sweating*<br><br>1 water /sweat / fluid on (skin) surface;<br>2 <u>water</u> evaporates;<br>3 uses heat from body / skin / blood;<br>4 ref to latent heat of vaporisation;<br><br>any three – 1 mark each [max 3] | | |
| | *vasodilation*<br><br>1 arterioles below surface dilate / expand / widen;<br>2 more blood flows near surface of the skin;<br>3 (through) capillaries;<br>4 heat lost from blood by radiation;<br>5 by convection;<br><br>any three – 1 mark each [max3] | | 1 I – arteries, blood vessels, veins<br>R ref movement of blood vessels |

| | | | |
|---|---|---|---|
| | **(c)** | 1 protection from pathogens / bacteria / viruses / chemicals / UV light / dehydration;<br><br>2 sensory function / ref to receptors in skin;<br><br>3 forms vitamin D;<br><br>any one – 1 mark each [max 1]<br><br>**[Total: 10]** | |
| **6** | **(a)** | formation of genetically identical offspring;<br><br>from a single parent / OWTTE; [max 2] | |
| | **(b)** | 1 side / lateral branches grow;<br>2 on underground stem;<br>3 tip of branch swells to form tuber;<br>4 food materials / starch deposited in swelling / tuber;<br>5 connection to parent plant dies / rots;<br>6 tuber (has buds that) can grow to form new plant;<br><br>any three – 1 mark each [max 3] | |
| | **(c)** | bacteria;<br><br>fungi; [2]<br><br>**[Total: 7]** | |

| | | |
|---|---|---|
| **7** **(a)** label **D** on descending region;<br>label **E** on steeply ascending region;<br>label **L** on early level / shallowly ascending region;<br>label **S** on high level region;<br>any three – 1 mark each [max 3]<br><br>**(b)** 1 nutrition / food / vegetation / producers;<br>2 disease;<br>3 predators; [3]<br><br>**[Total: 6]** | | 2 A – named disease<br>3 A – named predator |
| **8** **(a)** 1 made of protein;<br>2 are (biological) catalysts;<br>3 that speed up chemical reactions;<br>4 not changed by chemical reaction<br>any three – 1 mark each [3]<br><br>**(b)** **(i)** completion of curve; [1]<br><br>**(ii)** 55 (°C) if point to point curve; (+/- half square)<br>check against candidate's graph if free hand curve; [1]<br><br>**(iii)** 24 or 25 or check value from candidate's graph; (+/- half square) [1] | | |

**(iv)** rise in temperature increases the rate of reaction / ORA;

(rise) above optimum temperature / 55 °C rate falls; [2]

**(v)** <u>15 °C sample –</u>

1 at optimum / higher temperature enzyme active;

2 reaction occurs / starch digested;

<u>75 °C sample –</u>

3 no reaction at optimum temp;

4 enzyme destroyed / denatured (by 75 °C);

any three – 1 mark each [max 3]

**[Total: 11]**

| | | | | |
|---|---|---|---|---|
| 9 | (a) | (i) | phloem, **P**, and xylem, **X**, correctly labelled on stem;<br>phloem, **P**, and xylem, **X**, correctly labelled on leaf; [2] | |
| | | (ii) | 1 transports water;<br>2 transports minerals / salts / ions;<br>3 gives support (to soft tissues);<br>any two – 1 mark each [max 2] | 2 A – named example |
| | (b) | (i) | sucrose;<br>amino acids; [2] | |
| | | (ii) | leaf line arrowhead – towards stem;<br>root line arrowhead – towards root tip end;<br>stem line arrowhead – towards stem tip / root; [3] | A – two arrow heads to both ends of stem |
| | | | **[Total: 9]** | |