



BIOLOGY (US)

0438/31

Paper 3 Theory (Core)

October/November 2017

MARK SCHEME

Maximum Mark: 80

Published

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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Mark schemes will use these abbreviations

- ; separates marking points
- / alternatives
- I ignore
- R reject
- A accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- AVP any valid point
- ecf credit a correct statement / calculation that follows a previous wrong response or reverse argument
- ora
- () the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

| Question | Answer | | | | Marks | Guidance |
|----------|--------|----------------------------|--------------------------|--------|-------|--|
| 1 | | key | name of insect | letter | 4 | 1 correct = 1 mark 2 correct = 2 marks 3 correct = 3 marks 4 or 5 correct = 4 marks |
| | 1 (a) | body is long and thin | go to 2 | | | |
| | (b) | body is short and rounded | go to 3 | | | |
| | 2 (a) | body has a spotted pattern | <i>A. oculatus</i> | D | | |
| | (b) | body has a plain pattern | <i>P. pyralis</i> | E | | |
| | 3 (a) | no visible antennae | <i>C. lunaris</i> | C | | |
| | (b) | visible antennae | go to 4 | | | |
| | 4 (a) | body has a striped pattern | <i>G. lineatum</i> | A | | |
| | (b) | body has a dotted pattern | <i>C. septempunctata</i> | B | | |
| | | | | | | |

| Question | Answer | Marks | Guidance |
|-----------|---|-------|----------|
| 2(a) | a group of organisms of one <u>species</u> ; living in the same area, at the same time ; | 2 | |
| 2(b)(i) | phytoplankton / algae ; | 1 | |
| 2(b)(ii) | limpets / zooplankton / mussels / fish ; | 1 | |
| 2(b)(iii) | phytoplankton → zooplankton → fish → seagull ; | 1 | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|---|
| 2(b)(iv) | <p><i>starfish</i></p> <p>1. (population) increases ; 2. lack of predators / fewer sharks, to eat starfish ;</p> <p><i>limpets</i></p> <p>3. (population) decreases ; 4. increased predation / more starfish or more octopus to eat them ;</p> | 4 | |
| 2(b)(v) | <p>(more) hunting ; (named) pollution / contamination ; starvation / decreased food supply / competition for (food) ; disease ; more predators ; habitat destruction ; introduced / alien species ;</p> | 2 | <p>A. over-harvesting / fishing (for sharks) A. death of starfish / octopus</p> |
| 2(c) | (the) Sun ; | 1 | |
| 2(d) | <p>(A) condensation ;</p> <p>(B) evaporation ;</p> <p>(C) transpiration / evaporation / evapotranspiration ;</p> <p>(D)precipitation ;</p> | 4 | |

| Question | Answer | Marks | Guidance | | | | | | | | | | | | |
|-----------------------------|---|-----------|----------------------|---------|----------|------------|--------------------|--------|----------------------|-----------------------------|-----|-----------|-----------|---|--|
| 3(a) | <table border="1"> <thead> <tr> <th>natural</th> <th>chemical</th> <th>barrier</th> <th>surgical</th> </tr> </thead> <tbody> <tr> <td>abstinence</td> <td>contraceptive pill</td> <td>condom</td> <td>female sterilisation</td> </tr> <tr> <td>monitoring body temperature</td> <td>IUD</td> <td>diaphragm</td> <td>vasectomy</td> </tr> </tbody> </table> <p>;;;</p> | natural | chemical | barrier | surgical | abstinence | contraceptive pill | condom | female sterilisation | monitoring body temperature | IUD | diaphragm | vasectomy | 4 | <p>8 correct = 4 marks 7 or 6 correct = 3 5 or 4 correct = 2 2 correct = 1 1 correct = 0</p> <p>A IUD in barrier column</p> |
| natural | chemical | barrier | surgical | | | | | | | | | | | | |
| abstinence | contraceptive pill | condom | female sterilisation | | | | | | | | | | | | |
| monitoring body temperature | IUD | diaphragm | vasectomy | | | | | | | | | | | | |
| 3(b) | <p>hormones ;</p> <p>ovary ;</p> <p>egg cells ;</p> | 3 | | | | | | | | | | | | | |
| 3(c)(i) | <p>human immunodeficiency virus ;</p> | 1 | | | | | | | | | | | | | |
| 3(c)(ii) | <p><i>transmission</i> breast, milk / feeding ;</p> <p>mother to unborn child / through placenta / birth ;</p> <p>blood / blood transfusion / organ transplants ;</p> <p>injecting drugs / contaminated or sharing needles / contaminated or sharing syringes ;</p> <p><i>idea of via</i>, vaginal / seminal / sexual, fluids OR sexual intercourse / sex, without a condom (protection) ;</p> | 2 | | | | | | | | | | | | | |

| Question | Answer | Marks | Guidance |
|-----------|---|-------|---|
| 3(c)(iii) | <i>control</i> ref. to education ; needle exchange / not sharing needles / use sterile needles / AW ; free / use, condoms / femidoms ; free testing (for individuals) ; screening of, blood / blood products / AW ; antiretroviral / ARV, drugs ; <i>idea of</i> avoiding blood to blood contact ; | 2 | A barrier methods / protection, during sex(ual intercourse) |

| Question | Answer | Marks | Guidance |
|----------|---|-------|----------|
| 4(a) | A ; C ; D ; F ; | 4 | |
| 4(b) | fewer / less ; sticky ; heavier / denser ; spiky ; larger ; | 2 | I scent |
| 4(c) | <u>meiosis</u> ; | 1 | |

| Question | Answer | Marks | Guidance |
|----------|--------|-------|----------|
| 4(d) | | 4 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|--|
| 5(a)(i) | palisade (mesophyll) ; guard (cell) ; | 2 | |
| 5(a)(ii) | chloroplast ; | 1 | |
| 5(b) | cell membrane circled ; cytoplasm circled ; nucleus circled ; | 3 | minus 1 mark for each additional circled structure |
| 5(c) | carbon dioxide and water ; | 1 | |

| Question | Answer | Marks | Guidance |
|----------|---|----------|----------|
| 5(d) | <p><i>leaf A</i> bigger / larger, surface (area) OR bigger / thicker / more, mesophyll (layer / cells) ;</p> <p>absorbs more light / more chlorophyll / more chloroplasts / more gas exchange / more stomata ;</p> | 2 | |

| Question | Answer | Marks | Guidance |
|----------|---------|----------|---------------------------------------|
| 6(a) | | 3 | 1 mark for each correctly linked drug |
| 6(b)(i) | 66–70 ; | 1 | |
| 6(b)(ii) | 10(%) ; | 1 | |

| Question | Answer | Marks | Guidance |
|-----------|--|-------|----------|
| 6(b)(iii) | increases and decreases / after 20 years old it decreases ; peaks in the 16–20 year old age group / AW ; any correct reference to description of fluctuation at 51–65 year olds ; data quote with units ; | 3 | |
| 6(c) | bacterial ; | 1 | |

| Question | Answer | Marks | Guidance |
|-----------|--|-------|--------------------------------------|
| 7(a)(i) | warm, dry air ; | 1 | |
| 7(a)(ii) | 0.4 (mm per min) ;; | 2 | If no correct answer 4÷10 for 1 mark |
| 7(a)(iii) | (air bubble) moves, further / faster ; | 1 | |
| 7(b) | root (hair cell) ; by osmosis ; | 2 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|----------|
| 7(c) | (water) evaporates ; from (surface of mesophyll) cells ; water vapour diffuses ; through stomata ; | 3 | |
| 7(d) | <u>xylem</u> ; | 1 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|----------|
| 8(a) | carbohydrates ; fats / lipids ; protein ; vitamins / named vitamin ; minerals / name mineral ; fibre ; | 3 | |
| 8(b) | small intestine ; | 1 | |
| 8(c) | (A) <u>ureter</u> ; (B) bladder ; (C) <u>urethra</u> ; | 3 | |

| Question | Answer | | | | Marks | Guidance | |
|----------|------------------------------|--------------|-----------|---------------------|----------|----------|-----------------------------|
| 8(d) | changes in the body | urine volume | | urine concentration | | 2 | 1 mark for each correct row |
| | | increases | decreases | increases | decrease | | |
| | increase in body temperature | | ✓ | ✓ | | | |
| | increase in exercise | | ✓ | ✓ | | | |
| | increase in water uptake | ✓ | | | ✓ | | |

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