

Mark Scheme (Final)

Summer 2008

GCE O

GCE O Human Biology (7042/01)

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| Question Number | Answer | Mark |
|-----------------|---|------|
| 1(a) | <ul style="list-style-type: none"> • X - pelvis / hip; • Y - tibia / patella; | (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(b)(i) | <ul style="list-style-type: none"> • blood cells; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 1(b)(ii) | <ul style="list-style-type: none"> • lighter (but still strong) / stronger per unit mass; • less energy to move around; • less minerals needed to form it; | max (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(c)(i) | <ul style="list-style-type: none"> to prevent / reduce friction / shock absorber; | (1) |

| Question Number | Answer | Mark | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|--|------|-----------|---|---------------------|----------|---|-------|-------|---|-----------------|-----------|---|------------------------|------------------|---|------------------------|--|---|-----------------|---------------------|---------|
| 1(c)(ii) | <p>1 mark for each difference - maximum 3 marks</p> <table border="1" data-bbox="338 571 1064 956"> <thead> <tr> <th>Difference</th> <th>Bone</th> <th>Cartilage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>rigid/ not flexible</td> <td>flexible</td> </tr> <tr> <td>2</td> <td>heavy</td> <td>light</td> </tr> <tr> <td>3</td> <td>contains marrow</td> <td>no marrow</td> </tr> <tr> <td>4</td> <td>contains calcium salts</td> <td>no calcium salts</td> </tr> <tr> <td>5</td> <td>internal blood vessels</td> <td>no internal / has external blood vessels</td> </tr> <tr> <td>6</td> <td>muscle attached</td> <td>muscle not attached</td> </tr> </tbody> </table> | Difference | Bone | Cartilage | 1 | rigid/ not flexible | flexible | 2 | heavy | light | 3 | contains marrow | no marrow | 4 | contains calcium salts | no calcium salts | 5 | internal blood vessels | no internal / has external blood vessels | 6 | muscle attached | muscle not attached | max (3) |
| Difference | Bone | Cartilage | | | | | | | | | | | | | | | | | | | | | |
| 1 | rigid/ not flexible | flexible | | | | | | | | | | | | | | | | | | | | | |
| 2 | heavy | light | | | | | | | | | | | | | | | | | | | | | |
| 3 | contains marrow | no marrow | | | | | | | | | | | | | | | | | | | | | |
| 4 | contains calcium salts | no calcium salts | | | | | | | | | | | | | | | | | | | | | |
| 5 | internal blood vessels | no internal / has external blood vessels | | | | | | | | | | | | | | | | | | | | | |
| 6 | muscle attached | muscle not attached | | | | | | | | | | | | | | | | | | | | | |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(c)(iii) | <ul style="list-style-type: none"> allows bone / bone shaft to increase in length / grow; Reject stretch | (1) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 1(c)(iv) | <ul style="list-style-type: none"> rib attachment to sternum; base of sternum; in trachea; ear / pinna; (intervertebral) discs; nose; | max (2) |

(Total 12 marks)

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2(a)(i) | <ul style="list-style-type: none"> inverse relationship / less fibre - more cases of bowel cancer / ORA; | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 2(a)(ii) | <ul style="list-style-type: none"> 87/88 per 100 000 / range 87-88 per 100 000; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2(a)(iii) | <ul style="list-style-type: none"> 2.50 g; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2(a)(iv) | <p>2.22g gives 93 deaths, 2.50g gives 8- deaths per 100 000;</p> <ul style="list-style-type: none"> (change is) decrease of 13 deaths per 100 000; <p>2 marks for correct answer without working shown</p> | (2) |

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 2(b)(i) | <ul style="list-style-type: none"> • any leafy vegetable; • root vegetable; • fruits; • all bran / any whole grain cereal; • (wholemeal) bread; • (brown) rice | max (2) |

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 2(b)(ii) | <ul style="list-style-type: none"> • increases / aids peristalsis; • prevents constipation / removes faeces easily; • reduces risk of bowel cancer / eq; • less time for toxins to accumulate; | max (2) |

(Total 9 marks)

| Question Number | Answer | Mark | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------|----------|----------|---------|---|--|----------|---|----------|----------|---|--|----------|----------------------------------|----------|--|---|--|----------|--|----------|--|---------------------------------------|----------|----------|--|----------|----------|-------------------------------------|--|----------|
| 3 | 1 mark for each correct answer (x). | (9) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Process</th> <th style="width: 25%;">mitosis</th> <th style="width: 25%;">meiosis</th> </tr> </thead> <tbody> <tr> <td>Results in the formation of haploid cells</td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td>Nuclear membrane disappears during division</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>Homologous chromosomes line up in pairs</td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td>Only two daughter cells produced</td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td>Genetic material exchanged between chromosomes of a homologous pair</td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td>Daughter cells all identical to parent</td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td>Nuclear spindle forms during division</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>DNA content doubled before next division</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>Occurs only during gamete formation</td> <td></td> <td style="text-align: center;">X</td> </tr> </tbody> </table> | | Process | mitosis | meiosis | Results in the formation of haploid cells | | X | Nuclear membrane disappears during division | X | X | Homologous chromosomes line up in pairs | | X | Only two daughter cells produced | X | | Genetic material exchanged between chromosomes of a homologous pair | | X | Daughter cells all identical to parent | X | | Nuclear spindle forms during division | X | X | DNA content doubled before next division | X | X | Occurs only during gamete formation | | X |
| | Process | | mitosis | meiosis | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Results in the formation of haploid cells | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Nuclear membrane disappears during division | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Homologous chromosomes line up in pairs | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Only two daughter cells produced | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Genetic material exchanged between chromosomes of a homologous pair | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Daughter cells all identical to parent | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Nuclear spindle forms during division | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DNA content doubled before next division | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Occurs only during gamete formation | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

(Total 9 Marks)

| Question Number | Answer | Mark |
|-----------------|--|------|
| 4(a)(i) | <ul style="list-style-type: none"> • trachea - P; • bronchi - R; • diaphragm - S; | (3) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 4(a)(ii) | <ul style="list-style-type: none"> • heart / pericardium; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 4(a)(iii) | <ul style="list-style-type: none"> • breathing is movement of air in and out / ventilation of lungs; • respiration is the release of energy (in cells); | (2) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 4(b) | <ul style="list-style-type: none"> • intercostal muscles contract; • ribs swing up and outwards; • diaphragm (muscles) contracts; • diaphragm less dome shaped / flattened; Rejct moves down • leads to increase in volume of thorax / chest cavity; | max (4) |

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 4(c) | <ul style="list-style-type: none"> • particles / pollen / dust / eq; • trapped by mucus; • air warmed; • by radiation / surrounded by tissues at higher temperature; • air moistened; • by evaporation from lining of trachea / mucus; | max (4) |

(Total 14 Marks)

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(a)(i) | <ul style="list-style-type: none"> • ureter; | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 5(a)(ii) | <ul style="list-style-type: none"> • urine; Reject urea | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 5(a)(iii) | <ul style="list-style-type: none"> • cortex - filtration / ultra filtration / eq; • medulla - (selective) reabsorption / eq; | (2) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(b) | <ul style="list-style-type: none"> • glucose used by kidney cells for respiration; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 5(c)(i) | <ul style="list-style-type: none"> • bulk of water in filtrate reabsorbed; • some solutes reabsorbed; • urea left behind / not reabsorbed; | max (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 5(c)(ii) | <ul style="list-style-type: none"> • all glucose reabsorbed; • from filtrate / kidney tubule into blood; | (2) |

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 5(d)(i) | <ul style="list-style-type: none"> • sweating; • less water in the blood; • ref. to ADH; • produced by pituitary; • stimulates nephrons to reabsorb more water; | max (3) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 5(d)(ii) | <ul style="list-style-type: none"> • it will increase / eq; | (1) |

(Total 13 Marks)

| Question Number | Answer | Mark |
|-----------------|---|------|
| 6(a)(i) | <p>1 mark for correct answer.</p> <ul style="list-style-type: none"> male; <p style="text-align: right;">(1 Mark)</p> <p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> ref. to unpaired X chromosome in males / male XY; recessive (allele / gene) present in male always shows feature; females can have recessive allele hidden by dominant allele; females must receive a recessive allele from both parents / be homozygous recessive to show feature; <p style="text-align: right;">(3 Marks)</p> | (4) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 6(a)(ii) | <ul style="list-style-type: none"> $X^h Y$; | (1) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 6(b)(i) | <p>1 mark for each correct answer from any of the following (Accept other logical explanations for these points) - maximum 3 marks.</p> <ul style="list-style-type: none"> haemophilia allele is recessive; Sarah heterozygous / carries recessive X^h; Ian's mother / Catherine inherits X^h from her mother / Sarah / carrier; Ian inherits X^h from his mother / carrier; | max (3) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 6(b)(ii) | <ul style="list-style-type: none"> Colin is not affected / does not carry X^h / does carry X^H; thus girl cannot have $X^h X^h$ / have two recessive alleles / must have an X^H; | (2) |

(Total 10 Marks)

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 7(a) | <ul style="list-style-type: none"> • mother's blood has higher carbon monoxide content than normal; • mother's blood carries reduced amount of oxygen / A/W; • fetus receives reduced / too little oxygen supply; • baby born with reduced birth weight / mass / small; • may show brain damage symptoms; | max (3) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 7(b) | <ul style="list-style-type: none"> • may cause sunburn / blistering; • can damage skin tissues / cells; • ultra-violet can cause cell / nucleus / chromosome damage; • could lead to (more) mutations; • could lead to skin cancer / melanoma; | max (4) |

| Question Number | Answer | Mark |
|-----------------|--|---------|
| 7(c) | <ul style="list-style-type: none"> • loud noise causes large vibrations of eardrum; • this causes large vibrations of middle earbone / malleus; • ligaments to middle ear bone / malleus slackens; • person cannot hear / suffers temporary deafness; • (extensive exposure) can lead to cochlea damage / deafness; | max (3) |

(Total10 Marks)

| Question Number | Answer | Mark |
|-----------------|--|------|
| 8(a) | <p><u>Cerebral hemispheres</u></p> <ul style="list-style-type: none"> controls intelligence / reasoning / learning / controls voluntary muscle / memory / vision / hearing / personality; <p>(1 Mark))</p> <p><u>Cerebellum</u></p> <ul style="list-style-type: none"> balance / involuntary control of skeletal muscles / learned reflexes / named example; <p>(1 Mark)</p> | (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 8(b) | <ul style="list-style-type: none"> death; part C controls all involuntary muscles / gut / heartbeat / breathing; | (2) |

| Question Number | Answer | Mark |
|-----------------|---|---------|
| 8(c) | <ul style="list-style-type: none"> spinal cord; no impulses below break / lower body; no sensations (below break); paralysis (below break); <p>Reject</p> | max (3) |

(Total 7 Marks)

| Question Number | Answer | Mark |
|-----------------|---|------|
| 9(a) | <p>1 mark for each correct answer - maximum 4 marks</p> <pre> graph TD A["Blood vessel cut or damaged"] --> B["platelets;"] B --> C["Soluble prothrombin is changed into thrombin"] C --> D["plasma;"] D --> E["fibrin;"] E --> F["Erythrocytes/ red blood cells"] F --- G["Clot formed"] </pre> | (4) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 9(b)(i) | <ul style="list-style-type: none"> prevents further blood loss; prevents entry of bacteria / pathogens; <p>Reject germs</p> | (2) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 9(b)(ii) | <ul style="list-style-type: none"> clots / thromboses could occur in blood vessels and block them / cause strokes / heart attack / eq; | (1) |

(Total 7 Marks)

| Question Number | Answer | Mark |
|-----------------|---|------|
| 10(a)(i) | <ul style="list-style-type: none"> grinding / crushing / chewing (food); | (1) |
| 10(a)(ii) | <ul style="list-style-type: none"> molars / (type) A; | (1) |
| 10(a)(iii) | <ul style="list-style-type: none"> remove all bacteria / food remains / plaque collecting here; | (1) |
| 10(b) | <ul style="list-style-type: none"> enamel; dentine; calcium; bacteria; acid; erodes / corrodes / dissolves; | (6) |

(Total 9 Marks)