

# Mark Scheme (Final)

## January 2009

GCE

GCE Biology (6102/01)

## 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	<p>1. primary spermatocyte ;</p> <p>Comment:</p> <p>ACCEPT 1° spermatocyte</p> <p>2. secondary spermatocytes ;</p> <p>Comment:</p> <p>ACCEPT 2° spermatocytes</p> <p>3. spermatids ;</p> <p>4. genetic ;</p>	(4)

Question Number	Answer	Mark
2(a)	8.4 (kPa) ;  Accept $\pm 0.1$	(1)

Question Number	Answer	Mark
2(b)	<p><b>Comment:</b> ACCEPT mark points in any order</p> <ol style="list-style-type: none"> <li>1. dissolved / in solution ;</li> <li>2. as hydrogencarbonate (ions) / as <math>\text{HCO}_3^-</math> ;</li> <li>3. {attached to / eq} haemoglobin / as carbaminohaemoglobin / as carbamino compounds ;</li> </ol> <p><b>Comment:</b> "carboxyhaemoglobin" and "carbohaemoglobin" are incorrect</p>	(3)

Question Number	Answer	Mark
2(c)	<ol style="list-style-type: none"> <li>1. reference to transfer of oxygen from haemoglobin to myoglobin ;</li> <li>2. {acts as a store / eq} of oxygen ;</li> <li>3. in muscle (tissue) ;</li> <li>4. releases oxygen at (very) low partial pressures / eq ;</li> <li>5. {allows aerobic respiration to continue / eq} / {provides oxygen during strenuous activity / eq} ;</li> </ol>	max (3)

Question Number	Answer	Mark
3(a)(i)	<p>Oestrogen :</p> <ol style="list-style-type: none"> <li>1. responsible for {the repair / eq} of the {endometrium / lining of the uterus} ;</li> </ol> <p><b>Comment:</b> reference to "maintenance" of endometrium <b>incorrect</b></p> <p><b>ACCEPT</b> "thickening" of the endometrium</p> <ol style="list-style-type: none"> <li>2. {low / fall in} concentrations inhibit LH secretion / eq ;</li> <li>3. {high / rise in} concentrations stimulate LH secretion / eq ;</li> <li>4. reference to female secondary sexual characteristics / eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
3(a)(ii)	<p>Prolactin :</p> <ol style="list-style-type: none"> <li>1. stimulates {synthesis / production / secretion} of milk / eq ;</li> </ol> <p><b>Comment:</b> "ejection" of milk <b>incorrect</b> "prepares mammary glands for lactation" gains mp1 &amp; 2</p> <ol style="list-style-type: none"> <li>2. from mammary glands / eq ;</li> <li>3. inhibits ovulation / eq ;</li> <li>4. inhibits LH secretion / eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
3(b)(i)	<ol style="list-style-type: none"> <li>1. reference to overall increase ;</li> <li>2. relatively slow increase up to 24 weeks / greater increase from 24 weeks ;</li> <li>3. credit a manipulated quantitative comment (e.g. overall increase of 23 units or increases by 4.3 times) ;</li> </ol>	max (2)

Question Number	Answer	Mark
3(b)(ii)	<p>to maintain the endometrium / eq ;</p> <p><b>Comment:</b></p> <p><b>ACCEPT</b> "prevents menstruation"  <b>IGNORE</b> reference to "thickening"</p>	(1)

Question Number	Answer	Mark
4(a)	<ol style="list-style-type: none"> <li>soften food / reference to lubrication / makes it easier to swallow / eq ;</li> <li>reference to {dissolving (soluble) substances / amylase in solution / water for hydrolysis} / eq ;</li> </ol>	(2)

Question Number	Answer	Mark												
4(b)	<table border="1"> <thead> <tr> <th>Carbohydrate substrate</th> <th>Enzyme</th> <th>Products</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Maltose ;</td> </tr> <tr> <td></td> <td></td> <td>Glucose and fructose ;</td> </tr> <tr> <td></td> <td>Lactase ;</td> <td>Glucose and galactose ;</td> </tr> </tbody> </table>	Carbohydrate substrate	Enzyme	Products			Maltose ;			Glucose and fructose ;		Lactase ;	Glucose and galactose ;	(4)
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		Maltose ;												
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	Lactase ;	Glucose and galactose ;												

Question Number	Answer	Mark
4(c)	<ol style="list-style-type: none"> <li>reference to {length / folds / villi / microvilli} ;</li> <li>to increase the surface area /eq ;</li> <li>reference to {thin lining / simple epithelium / eq} ;</li> <li>reference to {increased diffusion / shorter diffusion distance} ;</li> <li>ref to {carrier / eq} proteins (in cell membranes) ;</li> <li>reference to presence of capillaries (inside villi) ;</li> <li>transport (away) of monosaccharides maintains concentration gradient / eq ;</li> </ol>	max (3)

Question Number	Answer	Mark
4(d)	{molecules are too big / eq} / no {carrier / eq} proteins ;	(1)



Question Number	Answer	Mark
5(a)(i)	<p><b>Comment:</b></p> <p>EXPECT change and time interval for each mark point</p> <p>1. reference to decrease from 2400 to 0600 ;</p> <p><b>Comment:</b></p> <p>ACCEPT "decreases for the first 6 hours"</p> <p>2. reference to increase from {0600 to 1200 /1800} ;</p> <p><b>Comment:</b></p> <p>ACCEPT "increases for the next 6 hours"</p> <p>3. reference to decrease from 1800 to 2400 ;</p>	<p>max (2)</p>

Question Number	Answer	Mark
5(a)(ii)	<p>1. photosynthesis is occurring ;</p> <p>2. oxygen produced (during photosynthesis) ;</p> <p><b>Comment:</b></p> <p>"oxygen is produced by respiration" is clearly incorrect</p> <p>3. by (aquatic) plants / eq ;</p> <p>4. rate of photosynthesis is greater than the rate of respiration / eq ;</p> <p><b>Comment:</b></p> <p>This mp would also mp1 for photosynthesis</p>	<p>max (2)</p>

Question Number	Answer	Mark
5(b)(i)	<p>1. {increase / eq} surface area ;</p> <p>2. increased <u>diffusion</u> of oxygen /eq ;</p>	<p>(2)</p>

Question Number	Answer	Mark
5(b)(ii)	<ol style="list-style-type: none"><li data-bbox="443 353 1129 427">1. (pigment has a) {high affinity / eq} for oxygen / eq ;</li><li data-bbox="443 456 1129 495">2. takes up oxygen at low {partial pressure / eq} ;</li></ol>	(2)

Question Number	Answer	Mark
6(a)(i)	<ol style="list-style-type: none"> <li>1. they are carried by the wind / eq ;</li> <li>2. to increase chance of pollination / eq ;</li> </ol> <p><b>Comment:</b> IGNORE references to fertilisation</p>	(2)

Question Number	Answer	Mark
6(a)(ii)	<ol style="list-style-type: none"> <li>1. increase surface area (of stigma) ;</li> <li>2. increase chances of trapping pollen grains / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
6(b)	<ol style="list-style-type: none"> <li>1. insect (-pollinated) ;</li> <li>2. presence of spikes / eq ;</li> </ol> <p><b>Comment:</b> ACCEPT a description of the shape</p> <ol style="list-style-type: none"> <li>3. to stick to insect / eq ;</li> </ol> <p><b>Comments:</b> ALLOW mark points 2 &amp; 3 if candidates suggest wind-pollinated IGNORE refs to size or weight of the pollen grains</p>	(3)

Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> <li>1. reference to use of a nail varnish impression / peel off epidermis ;</li> <li>2. mount on a (microscope) slide / eq ;</li> <li>3. use of microscope / eq ;</li> <li>4. <u>count</u> number of stomata in {field of view / a given area} ;</li> <li>5. reference to <u>calculating</u> number per unit area (e.g. divide the number by the f.o.v. or area) ;</li> <li>6. reference to <u>repeating count</u> and finding the mean number ;</li> </ol>	max (4)

Question Number	Answer	Mark
7(b)(i)	<ol style="list-style-type: none"> <li>1. tobacco has fewest / eq ;</li> <li>2. castor oil has the most / eq ;</li> <li>3. sunflower in between / eq ;</li> </ol> <p><b>Comment:</b> comparison of upper &amp; lower epidermis for a plant are incorrect "castor oil has the most, then sunflower, then tobacco" gains two marks.</p> <ol style="list-style-type: none"> <li>4. credit manipulated quantitative comparison (e.g. castor oil has 132 more per mm<sup>2</sup> than tobacco) / eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
7(b)(ii)	<ol style="list-style-type: none"> <li>1. <u>castor oil</u> ;</li> <li>2. has more stomata / eq ;</li> <li>3. this would increase the rate of transpiration / increase water loss ;</li> </ol>	(3)

Question Number	Answer	Mark
8(a)	<p>1. reference to blastocyst / eq ;</p> <p><b>Comments:</b></p> <p><b>ACCEPT</b> a description of the blastocyst blastocyst must be in the correct context</p> <p>2. {embeds / eq} into the {endometrium / eq} ;</p>	(2)

Question Number	Answer	Mark
8(b)	<p>1. reference to separation of maternal and fetal blood ;</p> <p><b>Comment:</b></p> <p><b>ACCEPT</b> reference to protection from high blood pressure</p> <p>2. {exchange of respiratory gases / eq} / provides oxygen / removes carbon dioxide ;</p> <p>3. {transfer / eq} of {nutrients / named example} ;</p> <p><b>Comment:</b></p> <p><b>IGNORE</b> "food"</p> <p>4. {transfer / eq }of {excretory waste / urea} ;</p> <p>5. {transfer /eq }of {antibodies /eq} ;</p> <p><b>Comment:</b></p> <p><b>ACCEPT</b> a ref to (passive) immunity</p> <p>6. {synthesis / secretion} of hormones / named example ;</p> <p>7. reference to barrier to {pathogens / some hormones} ;</p>	max (4)

Question Number	Answer	Mark
8(c)	<ol style="list-style-type: none"><li>1. (growth of fetus) increases demand for nutrients, / eq ;</li><li>2. reference to growth of the placenta ;</li><li>3. increased surface area of placenta / eq ;</li><li>4. thinning of interface / eq ;</li></ol>	max (2)