**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**


# MARK SCHEME for the October/November 2007 question paper

## 0610 BIOLOGY

**0610/06** Paper 6 (Alternative to Practical), maximum raw mark 40

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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**1 (a) (i)** **O** axes correctly orientated; (*x*-axis pH and *y*–axis time + units)
**A** axes labelled + units; (time per min – is minimum, do not accept time/m as m = metres) (R PH when both letters are in capitals or ph both lower case)
**S** even scale; (plots to fill more than ½ of printed grid, + or – 1/2 square for P and L)
**P** plot 5 points correctly for student 2; (R 2 curves – if student 1 data has been plotted accept O and A not P– if curve for student 1 has been erased or crossed through accept for P mark)
**L** ruled line point to point; (R extrapolation/line of best fit / thick line
Accept freehand if smooth and through all points if there is no 'sagging' between points)

Bar chart/histogram points **O, A and P** only (for **A** look for pH value in centre of each column./for **P** look at heights) [5]

**(ii)** Number points on ticks
**Description:**
1. enzyme/optimum pH 8/reaction works faster/fastest/better at pH 8; ( do not award neutral pH 8 as incorrect)
2. relevant comment re. rates slowing/speeding up either side pH 8/optimum/enzyme works fastest in alkaline range (this is a general point – to cover many different ways of expressing the idea of the curve)
3. correct use of figures from graph (other than pH 8); (use of one other figure + pH8 or use of two other figures – minimum)

**Explanation:**
4. <u>denaturing</u> (at extremes); (ignore if only refer to destroyed or damaged but look for mention of active site for point 5)
5. correct reference to <u>active site</u> being changed or distorted;
6. reference to causes of change in shape/contamination/inhibition/AW; [MAX. 5]

**(b) (i)** Number points on ticks
1. **enzyme** – concentration/amount/volume of enzyme different – even if more or less used/older versus freshly prepared enzyme;
2. **substrate** – different concentration/amount/type/volume of substrate/protein/film;
3. temperature is different;
4. presence of inhibitor/contamination/clean apparatus/AW;
   Ignore points about method/different end points in film clearing/agitation.
5. same pH/check pH; [MAX. 3]

**(ii)** Number points on ticks
1. **enzyme** – use of same volumes/conc./amount/same number of enzyme molecules;
2. **substrate** – use of same amount of protein/same film/same area/same thickness;
3. same temperature;
4. increase in range of pH tested;
5. agitate the same;
6. repeat experiment;
7. keep all variables the same (as alternative to points 1, 2 or 3);
   (this is a general point to cover all variables – if candidate has mentioned enzyme or substrate or temperature then these can score 3 marks separately – this marking point covers all variables and is not to be awarded with marking points 1 and 2 and 3.)
8. check buffers/pH;
9. clean apparatus/AW;
   (ignore ref. to humidity and light)
   (ignore ref to diff enzymes, diff types trypsin) [MAX. 5]

**[Total: 18]**

**2 (a) Drawing: S** size and proportion (drawing should be same size as Fig. 2.1)
(acceptable range– length 12.0 – 12.4cm and width 4.3 – 4.7cm; only check with ruler when in doubt)
**O** outline clear and serrated, to include petiole: R if shaded
**V** veins shown joined to central vein / midrib on **both** sides and branching; (see sheet of sampled drawing – minimum is 2 branched veins on both sides of midrib) [MAX. 2]

**Labels; 2 from:** midrib/main vein;
**network** of veins/branched veins;
petiole ; ignore stem/stalk
leaf blade/lamina; [MAX. 2]

**(b) (i)** calculation 30 – 36 (accept within this range – no need to calculate candidates' response. no units needed given on answer line – ignore if other units given) [1]

**(ii)** 1. means of scoring squares to avoid counting twice;
(look at diagram Fig. 2.1 for evidence of this)
2. whole squares counted;
3. part squares included in total leaf area;

**as alternative method**
2a. count number of empty squares;
3a. subtract from total; [MAX. 2]

**(c) (i)** epidermal cell;
guard cell; (label line must go to cell and not stoma)
(labels of cell 1 and cell 2 where candidates have partly misinterpreted question allow MAX. 1 and MAX. 1 for two lines without labels for named cells) [2]

**(ii)** 2 guard cells ringed; (R if more than 2 stomatal groups are ringed = 4 cells) [1]

Number points on ticks

**(d)** 1. use of microscope/ref to magnification;
2. preparation of epidermis for viewing e.g. epidermal peel/nail varnish/wax/reference to photograph; ( ignore ref to staining)
3. count number of stomata in a given **area**; (however expressed)
4. determine the area (viewed under the microscope);
5. calculate the area of the leaf;
6. total number of stomata for whole leaf to be described as calculation;
(this will be thousands)
7. description of some sort of calculation (only if marking points 5 or 6 have not been awarded)
(ignore – idea of counting bubbles from leaves, transpiration, AW) [MAX. 4]

**[Total: 14]**

**3** **(a)** completion of Table 3.1

Table 3.1

| dish | number of seedlings | |
|---|---|---|
| | green | White |
| A | 15 | 7 ; |
| B | 19 | 5 ; |
| total | 34 | 12 ; ecf |

(if error in counting is made – this error must be carried forward to contribute to total row of figures) [3]

**(b)** 1. ratio 3 green :1 white or allow 2.8 x green or 74% green and 26% white even if not linked to 3:1 ratio) (ecf will have to be considered here as well as in Table)
2. green is dominant;
3. white is recessive;
4. parents heterozygous;

(As alternatives to points 2 and 3, some candidates may have described the genotypes as homozygous **GG** and some may be heterozygous **Gg** green – accept as alternative wording for equivalent to points 2 and 3 above) [MAX. 2]

**(c)** 1. green (seedlings) will grow/white will die;
2. green have chlorophyll; (ignore ref to chloroplasts)
3. green can photosynthesise/make glucose/starch AW or white cannot;

(ignore make food but make glucose and carbon dioxide negates) [3]

**[Total: 8]**