



General Certificate of Education

Human Biology 1406

**HBI3X Externally Marked Practical
Assignment**

Mark Scheme

2009 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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TASK SHEET 1 (10 marks)

Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	a		Take reading (with thermometer) at regular / fixed / intervals;	1	<i>Accept take reading at beginning <u>and</u> at end</i>
1	b		Temperature does not become (an experimental) a variable / air temperature can vary / water temperature varies less than air temperature;	1	<i>Accept so temperature does not influence (the result).</i>

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2			Stop entry of <u>oxygen</u> ; Stop entry of other bacteria; (Oxygen in tube) removed by respiration / by bacteria;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	a		Boiled (fresh / stale) milk / resazurin plus water;	1	
3	b		Remained blue as no reduction / in absence of (live) bacteria / in presence of oxygen; OR Described change in colour with correct interpretation;	1	<i>Reject <u>no change</u>.</i> <i>Reject references to denaturing <u>bacteria</u>.</i>

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4			1. (Yes) End point difficult to see; 2. Different shades of pink / milk is also white; 3. Change in colour / oxygen (concentration) / reduction might be due to other reasons; 4. Did not change colour in time available / takes long time to change colour / both end up the same colour; 5. (No) Demonstrates presence of bacteria / qualitative / not quantitative; 6. Rate of colour change proportional to age; 7. Colour change can be seen;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	a		Quantitative - time taken is measurable / has units;	1	
5	b		Only some light / no light can pass through; Milk is opaque / milk is cloudy;	1 max	

TASK SHEET 2 (10 marks)**Assessment of presentation of raw data table**

Marking Guidance	Mark	Comment
Full descriptions of both the independent (temperature) and dependent variable (time taken for colour change to occur / to go pink') in table headings or in title to table.	1	
Temperature in first column;	1	
Units clearly stated and <u>only</u> in the heading and not in the body of the table.	1	<i>Time must be measured in appropriate units, e.g., minutes or seconds, not a combination of both</i>
Mean data show realistic trend.; (quality)	1	<i>To reward quality of data.</i>
	Total 4	

Assessment of Processing

Marking Guidance	Mark	Comments
Mean calculated accurately;	1	<i>Do not penalise candidates if, when calculating means, they have omitted <u>one</u> reading <u>in the entire table</u> which is clearly an anomaly. Calculation of mean cannot be based on mixed units, i.e., must be minutes or seconds but not both.</i>
Graph has temperature on x axis and rate of reaction / reduction or time taken to turn pink on y axis;	1	
Appropriate scales selected for the x and y axes;	1	<i>These scales should allow for both accurate plotting and reading of the graph. Both size of graph and proportion of graph paper used should be taken into account. Both axes should be linear.</i>
Both axes correctly labelled with appropriate units;	1	<i><u>Time taken</u> is minimum acceptable label for y axis</i>
All points plotted accurately;	1	<i>If ICT has been used to plot the graph, it should be possible to read the points with appropriate precision.</i>
Data presented as a line graph on which points are joined with curve of best fit or with ruled lines, as appropriate;	1	<i>Do not award mark if candidate has extrapolated beyond plotted points.</i>
	Total 6	

Written Paper (30 marks)**Section A (15 marks)**

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6			Correct interpretation <u>of data</u> ; Examples: presence or absence of anomaly / presence or absence of extreme / reference to natural variation / reference to experimental error / reference to wide or narrow range / cannot rely on one reading / can't rely on first reading	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	a		Correct temperature identified (units also required for accuracy); Temperature is where sample turned pink the quickest;	2	
7	b		Advantages: Shows milk is not suitable for drinking / will taste (or smell) unpleasant; Shows milk will have many bacteria; Easy for (non-scientist) to understand; Disadvantages: No standard / comparison; No definition of 'poor' / number (or type) of bacteria not known;	3 max	<i>Ignore references to poor people</i>

Question	Part	Sub Part	Marking Guidance	Mark	Comments
8	a		Use of ice (water bath);	1	<i>Accept use of fridge. Ignore reference to use of <u>thermostatic</u> / electronic bath to keep at 10 °C</i>
8	b		Bar chart; Data are discontinuous / categoric / qualitative;	2	Accept description of terms
8	c		(Blue) means resazurin / indicator has not been reduced; No / few <u>live</u> bacteria present / bacteria have been killed; Oxygen not removed from milk; By respiration (of bacteria);	2 max	
8	d		Same colours (as Table 2) for the 3 pasteurised samples / colours show correct order of sequence with deterioration of quality / all pink / all white; <u>Blue</u> for <u>both</u> UHT Long life and Sterilised milk samples;	2	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
9			Quicker than method to count bacteria; Colour change demonstrates bacteria present; Data qualitative / shows bacteria present but not how many;	2 max	

Section B (15 marks)

Question	Part	Sub Part	Marking Guidance	Mark	Comments
10	a		Temperature not high enough / time not long enough to kill all bacteria;	1	
10	b		Not always unsafe because (no mark) Valid comparison of treated and untreated milk being similar; For identified farm(s); E.g., treated and untreated milk from farms 5 / 7 / 9 has same number of bacteria or milk from farm 1	2 max	
10	c		Colonies can be counted by eye / bacteria cannot be seen by eye; Too many bacteria (to count) / need to use a microscope; Total number would include dead bacteria as well; (Which) cannot multiply / affect taste / affect smell of milk;	2 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
11	a	i	It removes / gets rid of bacteria (from teats);	1	<i>Ignore destroys / kills bacteria</i>
11	a	ii	Shows the effect of the disinfectant (with everything else the same);	1	<i>Accept disinfectant is the (experimental / independent) variable</i>
11	b		Treatment 2 because (no mark) $429/456 = 94\%$ against $452/592 = 76\%$ removed / killed Or $27/456 = 5.9 / 6\%$ against $140/592 = 23.6 / 27\%$ survive Or $27/456$ is less than $140/592$;	1	
11	c		Any three suitable limitations;;; e.g. <ul style="list-style-type: none"> • Transfer of bacteria by cloth/water possible / cloth/water not sterile • Concentration / disinfectant used could be ineffective • Disinfectant could contaminate milk 	3 max	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
12			Serial dilution; Any correct detail of serial dilution technique; Transfer of sample to agar plate using loop / spreader / swab / pipette; Any correct detail of aseptic transfer; (After incubation) reason for choosing which dilution to use; Multiply number of colonies by dilution / take account of dilution factor when using number of colonies counted;	4 max	