UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the June 2004 question papers

0610 BIOLOGY

0610/01	**Paper 1 (Multiple Choice), maximum mark 40**
0610/02	**Paper 2 (Core), maximum mark 80**
0610/03	**Paper 3 (Extended), maximum mark 80**
0610/05	**Paper 5 (Practical), maximum mark 40**
0610/06	**Paper 6 (Alternative to Practical), maximum mark 40**

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the June 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

Grade thresholds taken for Syllabus 0610 (Biology) in the June 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	40	36	28	24	20
Component 2	80	-	43	30	23
Component 3	80	62	44	33	26
Component 5	40	30	24	19	17
Component 6	40	32	23	17	14

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

JUNE 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 0610/01

BIOLOGY
Paper 1 (Multiple Choice)

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Question Number	*Key*	*Question Number*	*Key*
1	**D**	21	**D**
2	**C**	22	**C**
3	**C**	23	**C**
4	**B**	24	**C**
5	**D**	25	**B**
6	**B**	26	**D**
7	**B**	27	**A**
8	**B**	28	**A**
9	**B**	29	**C**
10	**D**	30	**C**
11	**A**	31	**B**
12	**D**	32	**B**
13	**C**	33	**C**
14	**B**	34	**A**
15	**D**	35	**D**
16	**D**	36	**D**
17	**D**	37	**D**
18	**C**	38	**C**
19	**A**	39	**A**
20	**B**	40	**A**

TOTAL 40

JUNE 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0610/02

BIOLOGY
Paper 2 (Core)

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Question 1

(a) **(i)** **X** labelled log/logarithmic/exponential phase; R - lag [1]

(ii) too little food materials/nutrients/sugar/glucose; I - starch

(build up) of waste/toxic products/alcohol/ethanol; [2]

(b) glucose/$C_6H_{12}O_6$; R - if any ref. to oxygen

ethanol/alcohol/$2C_2H_5OH$ + carbon dioxide/$2CO_2$; [2]
If using symbols then formulae must be correct and must balance

(c) liver;

destroys/damages cells/causes cirrhosis/impairs functions;

brain;

destroys damages cells/impairs functions/named function/slows impulses/reactions;

stomach;

develops ulcers/damages lining;

Any two pairs – 2 marks each [4]

Total [9]

Question 2

(a) **A** – cervix;

B – vagina/birth canal; [2]

(b) **(i)** **F** – label indicating cavity of oviduct;

(ii) **G** – label indicating ovary;

(iii) **O** – label indicating ovary; [3]

(c) widening of hips;

development of breasts/mammary glands;

growth of pubic/axillary hair;

subcutaneous fat layer;

Any three – 1 mark each [3]

(d) shedding of uterine lining/menstruation/(menstrual) period;

build up of new lining;

maturing of ovum;

ovulation;

vascularisation/maintenance of lining;

breakdown of lining if ovum not fertilised/no breakdown if ovum fertilised;

Any four – 1 mark each [4]

Total [12]

Question 3

(a)

Diagram letter	Name of cereal
A	*Secale*
B	*Oryza*
C	*Triticum*
D	*Hordeum*
E	*Avena*

First four correct responses – 1 mark each [4]

(b) no coloured petals/inconspicuous flowers;

no nectary/nectar/nectary guides;

no scent/odour;

stamens exposed outside of petals/OWTTE;

stigma exposed outside of petals/OWTTE;

feathery stigma;

Any three – 1 mark each [3]

(c) **(i)** magnesium needed to make chlorophyll;

nitrates needed to make amino acids/protein/enzymes/DNA; [2]

(ii) increased growth of algae/aquatic plants;

covers water surface/blocks entry of light;

underwater plants etc die;

(decay) bacteria/decomposers increase;

use up oxygen;

water becomes anaerobic;

aquatic animals die/migrate;

eutrophication;

Any four – 1 mark each [4]

Total [13]

Question 4

(a) suitable scale and label on Y axis;

at least 6 points plotted accurately;

points joined; [3]

(b) (i) (rate of water loss) will decrease/lower peak;

because (increased humidity) decreases concentration gradient; [2]

(ii) light/sunlight;

affects opening of stomata;
brighter light (- wider opening) increases water loss;

temperature/heat;

affects humidity of air/concentration gradient/higher temp particles/molecules move quicker;
higher temperature (– lower humidity) increases water loss/rate of transpiration rises;

wind/air movement;

moves humid air/water molecules/particles away from stomata/alters concentration gradient;
more wind (– more dispersal of water vapour) increases water loss;

Any two factors plus explanation – 3 marks each [6]

(c) (i) xylem (vessels); [1]

(ii) support/skeletal tissue/transports minerals; [1]

Total [13]

Question 5

twenty-three/23;

forty-four/44;

haploid;

zygote;

Y; [5]

Total [5]

Question 6

food material	digestive enzyme	source of enzyme	end products
	amylase/ carbohydrase;	pancreas;	maltose/glucose/ simple/reducing sugar;
protein;	protease/pepsin;		polypeptides/amino acids;
	lipase;		glycerol;

[8]

Total [8]

Question 7

(a) **(i)** spider/fox/toad/lizard; [1]

(ii) primary consumer eats only vegetation/plants/producers;

e.g. herbivorous insect/vole/rabbit;

secondary consumer eats meat/flesh/animals/primary consumers/herbivore;
e.g. stoat/fox/kestrel/carnivorous insect/spider/toad/lizard; [4]

(b) **(i)** sun/sunlight; [1]

(ii) rabbits maintain a constant body temperature/ref. to higher metabolic rate;

temperature above environment;

greater heat loss to the environment;

loss of more energy in faeces/urine/in excreta/via excretion by rabbit;

Any three – 1 mark each [3]

(c) rabbit population drops (because of disease outbreak);

less food for stoats/more food for voles;

they eat more voles/voles increase in number;

less food for kestrels/more food for kestrels;

kestrels decrease/kestrels increase;

Any four – 1 mark each (in context of one prediction) [4]

Total [13]

Question 8

(a) (during exercise) muscles need more energy;

released by respiration;

need supply of more oxygen; I - air

(more) glucose;

need removal of more carbon dioxide/heat;

(these are) carried in blood;
(Only need ref. to more once in response)

Any four – 1 mark each [4]

(b) (i) adrenalin; [1]

(ii) (increase) the rate of beating;

(increase) depth of beat/stroke volume/volume of blood pumped at each beat; [2]

Total [7]

JUNE 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0610/03

BIOLOGY
Paper 3 (Extended)

UNIVERSITY of CAMBRIDGE
International Examinations

Question 1

(a) plants/vegetation/producers/holophytes ; [1]
® grass/vegetables

(b) jackals + lions ; BOTH NEEDED FOR THE MARK [1]

(c) grass →sheep → jackal
one mark for all organisms in correct order ;
one mark for arrows correct ; [2]
Ⓐ grassland ® refs to plants

(d) packs are more successful catching their prey AW ;
animals may share food ;
more likely to be successful in stealing food from lions ;
packs are less prone to attack from predators ; [max. 1]

(e) jackals also eat other animals ; ® have other food sources unqual.
jackals kill sheep from other (unprotected) flocks ;
other plausible reason ; [max. 1]

(f) i. artery/suitable named artery ; ® aorta
ii. vein/suitable named vein ; ® blood vessels unqual.
iii. trachea/windpipe ; ® throat unqual.
iv. spine/backbone/vertebrae ; ® bones in neck
v. spinal cord/nerve ;
vi. larynx/voice box/thyroid/epiglottis ;
vii. oesophagus/gullet ;
viii. lymph vessel/lymph gland ; [max. 2]

(g) i. plastic may be non-biodegradable AW ;
ii. so will result in + litter/land pollution/accumulation of waste/visual pollution ;
iii. ref. to scavengers may choke on plastic AW ; Ⓐ other viable ideas
iv. ref. to air pollution if burned ; [max. 2]

[**max. 10]**

Question 2

(a) a diet containing all + (essential) foodstuffs/nutrients AW ;
in the correct + proportions/amounts ;
ref. to the supply of the right amount of energy/to maintain health AW ; [max. 2]

(b) carbohydrates ;
fats ; [2]

(c)(i) 1. **Z** ;
2. **Y** ;
3. **X** ; [3]

(ii) heart disease/heart attack ; ® heart problems unqual.
stroke ;
diabetes ;
blindness ;
high blood pressure ;
varicose veins ; ⓘ refs. to atherosclerosis etc
breathing problems/easily tired ;
arthritis ;
back problems/joint problems AW ;
loss of sex drive AW/ref. to depression ; [max. 2]

(d) 1. simple sugars ;
2. fatty acids ;
glycerol ;
3. amino acids ; [4]

(e)(i) enzymes ; Ⓐ biological catalysts ® specific named enzymes [1]

(ii) ACCEPT CONVERSE ARGUMENTS
ref. to small molecules are soluble ; Ⓐ to make the molecules soluble
small molecules can be absorbed or diffuse + through gut wall/into blood stream AW ;
to provide basic units + for synthesis of different molecules AW/for a named process ; [max. 2]

[max.16]

Question 3

(a) 800 (cm^3); (MARK IN TABLE OR IN SPACE) [1]

(b) 1. lung(s) ;
2. skin ; ® sweat gland
3. kidney ;
4. large intestine/colon ; [4]

(c)(i) IF VOLUME IS WRONGLY STATED, REJECT EXPLANATION
(SWEAT)
(volume of sweat) would increase/ref. to more AW ;
ref. to cooling effect/stop body overheating AW ; linked to first point [2]

(URINE)
(volume of urine) would decrease/ref. to less AW ;
due to increase in sweat production/reduce chance of dehydration AW/ less water in blood/to keep water in blood constant ;
due to secretion of ADH/due to increased absorption in nephron ; [max. 2]

(ii) homeostasis ; [1]

(d) glucose ;
pancreas ;
secretion ;
glycogen ;
insulin ;
liver ; [6]

[max. 16]

Question 4

(a) ref. to large numbers ;
ref. to large surface (area) ;
ref. to presence of mitochondria + to provide energy ;
Ⓐ other viable cell features [max. 2]

(b)(i) absorption of a substance AW + into a cell/across a membrane AW ;
against/up + a concentration gradient ;
ref. to needing energy ; [2]

(ii) active transport/active uptake + requires energy ; [1]

(c)(i) i. ref. to tubular structure/elongated/long (cells) AW ;
ii. ref. to lack of cross-walls/open ended ;
iii. ref. to no (living) contents AW ; Ⓘ dead unqual.
iv. ref. to transport/passage/movement of + water/minerals ;
linked to i., ii. or iiii.
v. ref. to thick/strong/lignified + (cell) walls ;
vi. ref. to support ; linked to v.
vii. ref. to pits ; [max. 3]

(ii) i. ref. to transpiration/evaporation ;
ii. ref. to pull from above/pull from leaves AW ; Ⓘ pull unqual.
iii. ref. to water potential gradient AW ;
iv. ref. to capillarity/root pressure ;
v. ref. to cohesion AW ; [max. 2]

[max. 10]

Question 5

(a) i. ref. to greenhouse effect/carbon dioxide is a greenhouse gas ;
ii. details of greenhouse effect ;
iii. ref. to desertification/global warming/climate change/example ;
iv. ref. to more plants AW ; Ⓐ plants will produce more oxygen [max. 2]

(b)(i) **ACCEPT ALTERNATIVE MARK SCHEME FOR TO NUCLEAR POWER**
i. ref. to burning/combustion + of fossil fuels ;
ii. produces sulphur dioxide ; Ⓡ gives off fumes unqual. Ⓘ nitrogen oxides
iii. (SO_2) forms acid rain ; linked to ii.
iv. ref. to one form of damage by acid rain to plants/animals/buildings rocks;
Ⓐkills plants/fish
v. ref. to spoil heaps/open cast damage + as result of mining coal ;
vi. ref. to hot water effluent AW + damage to rivers AW ; [max. 3]

(ii) **IGNORE REFS TO CARBON DIOXIDE**

i. ref. to deforestation ;
ii. could be replaced by monoculture ;
iii. destruction of natural habitat(s) ;
iv. ref. to disruption of food chain ;
v. ref. to decreased + biodiversity/species or extinction of species ;
vi. ref. to changes in rainfall/increase risk of flooding/disruption of water cycle ;
vii. less transpiration so less water vapour in atmosphere ;
viii. ref. to increased risk of soil erosion/ref. to silting of rivers ;
ix. can result in desertification ;
x. ref. to drop in atmospheric oxygen levels AW ;
xi. ref. to particulates from burning wood or charcoal AW ; [max. 3]

(iii) **IGNORE REFS TO CARBON DIOXIDE**

i. ref. to combustion of petrol/diesel/gasoline or ref. to hot engine ;
ii. produces oxides of nitrogen ; linked to i. ® nitrogen compounds
iii. ref. to acid rain ; linked to ii.
iv. ref. to one form of damage by acid rain to plants or animals ;
v. ref. to lead in petrol AW/lead oxide/particulates in diesel ;
vi. ref. to one effect of lead or particulates on humans ;
vii. ref. to production of carbon monoxide ;
viii. reduces oxygen carrying capacity of blood AW ; linked to vi.
ix. ref. to noise pollution ;
x. ref. to smog ;
xi. ref. to animals killed by vehicles AW ; [max. 3]

[max. 11]

(b)(i) **ALTERNATIVE MARK SCHEME FOR NUCLEAR POWER**

i. ref. to nuclear power ;
ii. ref. to escape of radiation AW ;
iii. ref. to effect of radiation on animals/plants (cancer/leukemia/mutations/ polyploidy etc) ; ® kills animals/plants unqual.
iv. ref. to problems with waste disposal or storage/risk of explosion or meltdown ;
v. ref. to spoil heaps/open cast damage + as result of mining uranium ;
vi. ref. to hot water effluent AW + damage to rivers AW ; [max. 3]

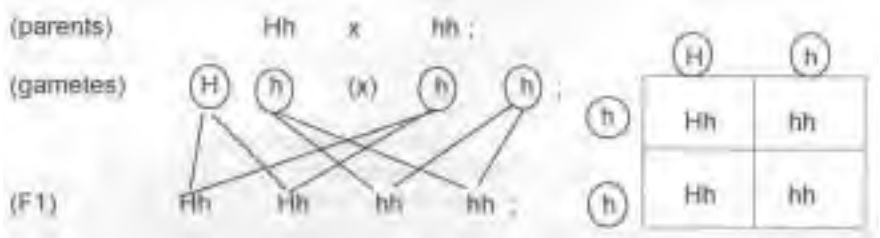
Question 6

MARK F1 BASED ON GAMETES, EVEN IF PARENTS ARE WRONG [MAX. 1]

(a)(i) MAX. **TWO** WITHOUT RATIO
ACCEPT PUNNETT SQUARE

IF LINES ARE USED, THEY MUST BE CORRECT FOR F1 MARK

IF WRONG PARENTS ARE USED, AWARD 1 MAX. FOR CORRECT WORKING THROUGH TO F1

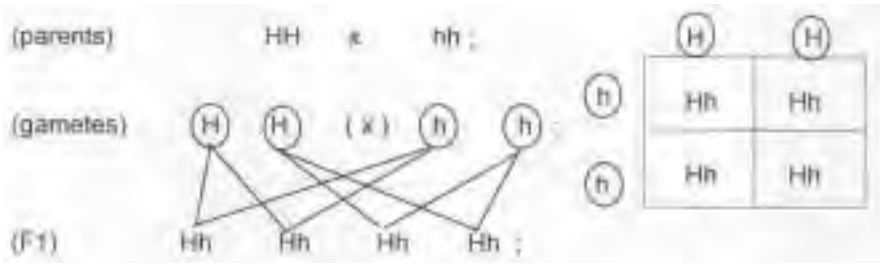


ratio = 1 : 1/one long haired to one short haired AW/50 : 50 ; [max. 3]

(ii) MAX. **TWO** WITHOUT RATO
ACCEPT PUNNETT SQUARE

IF LINES ARE USED, THEY MUST BE CORRECT FOR F1 MARK

IF WRONG PARENTS ARE USED, AWARD 1 MAX. FOR CORRECT WORKING THROUGH TO F1



ratio = all short haired /1 : 0 AW ; [max. 3]

(b) ref. to intermediate/medium + hair length AW ; [1]
® mixture of hair lengths

[max. 7]

Question 7

(a) **ALL THREE NEEDED FOR THE MARK**
ASSUME ANSWER REFERS TO COLUSTRUM, IF NOT STATED
colostrum has: less fats + more protein + less sugar ; [1]
Ⓐ figures for comparison
Ⓐ converse arguments

(b) 2 x 10 ;
= 20 g ; AWARD BOTH MARKS FOR CORRECT ANSWER ONLY [2]

(c)(i) any named citrus (drink)/blackcurrant juice ; [1]

(ii) i. ref. to sugar deposited on teeth ;
ii. ref. to bacteria feed on sugar/respire sugar ;
iii. produces acid ; linked to bacteria
iv. (acid) attacks/reacts with/eats into/dissolves + teeth/enamel AW ;
v. teat keeps sugars in contact with teeth AW ; [max. 4]

(d) ref. to anaemia/anaemic/pale appearance AW ;
ref. to lacking energy/suffering from fatigue/tiredness AW ;
® weakness unqual.
ref. to breathlessness ; ® breathing problems
ref. to lack of resistance to disease ; [max. 2]

[max. 10]

JUNE 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 0610/05

BIOLOGY
(Practical)

UNIVERSITY of CAMBRIDGE
International Examinations

Question 1

(a) water ~ yellow / brown ; (*A*) *"iodine coloured"* (*R*) *"no change" alone*

starch ~ blue-black ; (*A*) *qualified blue (e.g. dark) / black / dark particles* *(R) "dark brown" alone* **2**

(b) (i) 16 drops iodine ;
iodine drops in two groups ; **2**

(ii) ruled lines ;
3 columns / rows ; [*ignore conclusions*]
headings ; [*3 ~ A, B, Time*]
space for 8 sets of recordings ; (*A*) *9*
neatness ; [*include boundary*] **max 4**

(iii) at least one result recorded (for A & B) ;
complete set of results ;
appropriate colours recorded (not conclusions alone) throughout ;
(*A*) *no change / ditto marks etc*
(*R*) *no result / nothing* **3**

(c) *Refer to candidate's results in (b)(iii)*

with salt takes less time *or* suitable time ref. ;
salt , speeds up enzyme / makes reaction faster (than without) *or* suitable rate ref. ;
figures compared ; **max 2**

(d) fair (test) / control / explained ;
compensate for volume of salt / make volumes equal ;
suitable ref. equal concentrations amylase ; (e.g. same dilution) **max 2**

(e)
1 all other factors constant ;
2 equal , volumes / concentration , of enzyme ;
3 equal , volumes / concentration , of starch ;
4 same temperature ;
5 vary pH ;
6 detail of suitable method ;
7 different sampling procedure ;
8 different testing procedure ;
9 repeat of previous method ;
10 record results ;
11 repeat / replicates ; **max 5**

[Total : 20]

Question 2

(a) (i) Drawing ~ clear outline S1 ;
at least 5 cm in one direction ;
detail of venation ;
wing and seed distinct ;

Labels ~ seed ;
point of attachment ; **6**

(ii) clear measurement line shown ;
corresponding to length of drawing ;
length of drawing measured correctly (± 2 mm) ;
units ; [***once only***]
"drawing length ÷ specimen length" ;
answer correct ; [***to 1dp, no units***] **(*A*) *ratio x:1*** **(*R*) %** **6**

(b) (i) accurate trace ; [***must be cut out / recognisable***]
answer ; [***4 – 5 cm^2***]
units ; **max 3**

(ii) counting (whole) squares ;
ref. part squares ;
detail ; (e.g. counting squares greater than half
leaving squares less than half
estimating part squares into whole
large square = 1cm^2
small square = 4mm^2
25 small squares = 1 large square / small squares ÷ 25 = cm^2)
x 2 for both sides ; [***move down from (i) if necessary***]
Allow 1 mark for
length x width / area of rectangle – uncovered part alone **max 3**

(c) wind / storm + description ; [***increase / decrease , distance = minimum***]
rain + description ;
other suitable environmental factor ; ;
(e.g. sheltering by leaves +
sheltering by , trees / large structures +
humidity +
rivers / moving water (floats) +
animals eating + **max 2**

[Total : 20]

JUNE 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 0610/06

BIOLOGY
(Alternative to Practical)

UNIVERSITY of CAMBRIDGE
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Question 1 ***(a)*** *cell diameters as marked on Figs 1.1, 1.2, 1.3 and 1.4*
range of acceptable values:-

fig	cm	mm
1.1	2.1 or 2.25	21 to 22.5
1.2	ditto	ditto
1.3	1.5 or 1.6	15 or 16
1.4	2.5 to 2.6	25 or 26

incorrect or no units given = 2 max

[3]

(b) **identification of solution =2** **this will be marked independently of the explanation**
cell in Fig 1.2 *1.5% sugar solution*
cell in Fig. 1.3 *5% sugar solution*
cell in Fig 1.4 *water*

explanation – up to possible 6 marks the explanation will be marked to match the diagram figures.

cell in Fig 1.2 *[1.5% sugar solution]*

cell in Fig. 1.2 same size/ width / not changed [as in Fig. 1.1];
water taken in balances that lost by cell ;
no osmosis / diffusion ;
concentration gradient is in equilibrium;

cell in Fig 1.3 *[5% sugar solution]*

cell in Fig 1.3 smaller or has shrunk [than cell in Fig 1.1] / width or vacuole has decreased;
water lost from cell;
by osmosis / diffusion;
detail re concentration difference or water potential involved / plasmolysed / become flaccid;

cell in Fig 1.4 *[water]*

cell in Fig. 1.4 larger [than in Fig. 1.1] / width has increased;
water taken into cell;
by osmosis / diffusion;
detail re concentration difference or water potential involved / turgidity ;

MAX [8]
[Total : 11]

Question 2 ***(a)(i)*** *Tube* **A – 12 or 13** *or* ***12 to 13*** *(minutes);*

Tube **C – 5 or 6** or **5 to 6** *(minutes);*

[2]

(ii) *less time / faster / speeds up enzyme reaction or activity / acts as an activator;*
7 *minutes less for Tube C;* [some mathematical use of values in (a)(i)]

[2]

(iii) *Control (for tube A) / comparison with the other tubes / starch does not break down by itself;*

[1]

(b) ***1*** *same amount / volume / concentration of amylase;*

2 *same amount / volume / concentration of starch;*

3 *same temperature;*

4 *vary pH, at least 3 for a range ;*

5 *reasonable suggested detail to obtain a different pH, ideally use of buffer;*

6 *regular timing for testing;*

7 *repetition;*

8 *3 named items of apparatus selected;*

[to include reference to timer / white tile/ test tubes / beakers / water bath / stirrer etc]

[MAX 5]

[Total : 10]

Question 3 ***(a)(i)*** *Drawing:-*

O *one fruit only;*
S *suitable size; [larger than original]*
A *accurate proportions and clear outline with only appropriate shading;*
L *Label – seed(s) ;*

[4]

(ii) *length of drawing* ***AND*** *length of fig 3.1 [accept –3.5 to 4.7cm];*

correct calculation method and answer;

[**only one mark** for working and calculation]

[2]

(iii) **the printing of the grid is not mm^2 so 2 schemes**

	if a ruler has been used	*if squares have been counted*
range of areas accepted	*6.0 to 7.5 [cm^2] ;*	*170 to 220 ;*
1st detail check fig. 1.3	*ruled lines on printed grid for length and width;*	*indication of dots or lines to count squares;*
2nd detail	*a simple maths such as multiplication or l x w;*	*some ref to ½ squares counting empty squares;*

.

[3]

(b) (i)

surface area of 'wing' of fruit cm^2	distance fruit travelled cm **mean values calculated**
32	**25**
64	**29**
96	**36.2**
128	**43**
160	**50**

One error = -1mark and 2 errors = -2 or 0 marks

[2]

(ii) ***O*** *orientation of axes;*
A ***both*** *axes labelled + units;*
S *even scale;*
P *plotted correctly;*
L *line of best fit or ruled line point to point;*

[MAX 4]

(iii) *1. general trend - larger surface area – longer the distance travelled/ positive correlation;*

2. *detail eg almost straight line / linear relationship / proportionality eg in direct proportion;*

3. *calculate with reference to figures;*

[**MAX 2]**

(iv) *reduce competition of seedlings/ stop crowding/ over population;*

more space / light / water / minerals / nutrients;

avp, inhibition/ colonise new areas;

ignore reference to survival of fittest and extinction

[MAX 2]
[Total :19]