

# GCSE 2004

## *June Series*



# Mark Scheme

## Biology (Human)

### 3415/F

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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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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## GCSE BIOLOGY (HUMAN)

### INFORMATION FOR EXAMINERS

#### 1. General

The mark scheme for each question shows:

- the marks available for each part of the question;
- the total marks available for the question;
- the typical answer or answers which are expected;
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:  
where consequential marking needs to be considered in a calculation;  
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

#### 2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following lines is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; e.g. allow smooth / free movement.)

#### 3. Marking points

##### 3.1 Marking of Quality of Written Communication

Where *Quality of written communication* appears in the mark scheme, one mark is to be awarded for either of the following points:

- Using correct scientific terms
- Correct sequencing or linking of ideas or points

The mark scheme will specify which of the points is to be awarded in a particular question. A QoWC mark can be awarded for a scientific answer, even if it is not accurate. It cannot be awarded for a nonsensical or non-scientific answer.

On the script, the QoWC tick should be identified by a ‘q’ written next to it.

##### 3.2 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as \* in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

### 3.3 Use of chemical symbols/formulae

If a candidate writes a chemical symbol/formula instead of a required chemical name, full credit can be given if the symbol/formula is correct and if, in the context of the question, such action is appropriate.

### 3.4 The marking of quantitative relationships

Full credit can be given for a correct quantitative relationship expressed in:

- named units;
- physical quantities;
- standard symbols;
- a combination of physical quantities and units.

No credit can be given for any quantitative relationship expressed in terms of:

- a combination of physical quantities, units and symbols;
- a diagram, e.g. the ohm's law triangle, unless the rest of the answer shows clearly that the candidate understands the relationships involved.

### 3.5 Marking procedure for calculations

**3.5.1** Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown. However:

- if the answer is incorrect, mark(s) can be gained by correct substitution/working and this is shown in the 'extra information' column;
- if the answer is correct, but an incorrect relationship is written in the working, then no marks can be awarded (see 3.5.2).

**3.5.2** Where calculations are based on incorrectly recalled relationships, neither the incorrectly recalled relationship, nor the resulting calculation based on the incorrect relationship, will be credited.

### 3.6 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

### 3.7 Errors carried forward

There should be no error carried forward from a previous answer which has been based on wrong science. Any error in the answers to a structured question should be penalised once only.

Examples

- (a) A candidate who calculates average speed using  $\text{speed} = \text{time}/\text{distance}$  **and** then proceeds to use this incorrect answer to calculate an acceleration based on the correct quantitative relationship should be given credit for the use of the correct acceleration relationship but none for either numerical answer.
- (b) A candidate who incorrectly calculates average speed using  $\text{speed} = \text{distance}/\text{time}$  and then proceeds to use this incorrect value to calculate an acceleration based on the correct quantitative relationship, should be given credit for the use of both correct quantitative relationships **and** for the correct substitution and use of the incorrect value in the calculation of the rate of acceleration.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

### 3.8 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

### 3.9 Brackets

(.....) is used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

### 3.10 Interpretation of marginal points

There will be times when the answer is almost, but not quite, correct. Some examiners would award a mark while others would not. In any one script, an attempt should be made to balance these nearly correct answers by giving the mark on some occasions but not on others. If this is not done, the marking would end up being too lenient or too harsh.

### 3.11 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.



**GCSE Biology (Human)  
Foundation Tier 3415/F**

**3415F Q1**

question	answers	extra information	mark
	<u>In sequence:</u>		
	retina		1
	(optic) nerve		1
	iris		1
	sclera		1
	(suspensory) ligament		1
total			5

**3415F Q2**

question	answers	extra information	mark
(a)(i)	A = nucleus		1
	B = (cell) <u>membrane</u>		1
(ii)	(cell) membrane		1
(b)	70	if correct answer, ignore working or lack of working  $\frac{63 + 78 + 69}{3}$ for 1 mark	2
total			5

3415F Q3

question	answers	extra information	mark																				
(a)	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="text-align: center;"><b>Drug</b></td> <td style="text-align: center;"><b>Effect</b></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Alcohol</td> <td style="text-align: center;">Lung cancer</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Tobacco</td> <td style="text-align: center;">Bronchitis &amp; emphysema</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Slowed reactions</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Reduced oxygen-carrying capacity of the blood</td> <td></td> </tr> </table>		<b>Drug</b>	<b>Effect</b>			Alcohol	Lung cancer			Tobacco	Bronchitis & emphysema				Slowed reactions				Reduced oxygen-carrying capacity of the blood		<p>If 2 lines to <b>one</b> Effect box, do <b>not</b> award that mark</p>	3
	<b>Drug</b>	<b>Effect</b>																					
	Alcohol	Lung cancer																					
	Tobacco	Bronchitis & emphysema																					
		Slowed reactions																					
		Reduced oxygen-carrying capacity of the blood																					
(b)	nicotine		1																				
(c)	it increases the death rate / it <b>or</b> the earlier the person starts smoking the more chance of dying (earlier) <b>or</b> the longer the person has been smoking the more chance of dying (earlier)	do <b>not</b> accept ‘smoking kills’ <b>or</b> ‘smokers more likely to die’ <b>or</b> ‘the more you smoke the more chance of dying’	1																				
total			5																				

## 3415F Q4

question	answers	extra information	mark
(a)	<u>In sequence:</u> (ribcage) up / out (diaphragm) down / flatter		1 1
(b)(i)	<u>On diagram:</u> oxygen arrow to blood from air <b>and</b> CO <sub>2</sub> arrow to air from blood  oxygen arrow to red blood cell  CO <sub>2</sub> arrow from plasma		1 1 1
(ii)	diffusion		1
(iii)	large surface <b>or</b> large area	<b>do not accept space</b>	1
total			7



## 3415F Q5

question	answers	extra information	mark
(a)	<u>In sequence:</u> heron frog slug lettuce		1
(b)(i)	light / sun	ignore photosynthesis / respiration cancel mark if water / ions etc given do <b>not</b> accept heat	1
(ii)	traps / absorbs light	accept energy for light do <b>not</b> accept collects / attracts do <b>not</b> accept 'traps sun'	1
(iii)	162	if correct answer, ignore working / lack of working  $\frac{10 \times 1620}{100}$ for 1 mark	2
total			5

## 3415F Q6

question	answers	extra information	mark
	<u>In sequence:</u> light gravity moisture hormones dark more		1 1 1 1 1 1
total			6

## 3415F Q7

question	answers	extra information	mark
(a)	(in table) 4920		1
(b)	exercise produces heat <b>or</b> causes rise in body temperature / makes athlete hot	named activity produces heat	1
	needs to cool <b>or</b> needs to maintain temperature <b>or</b> sweat helps to cool the body		1
(c)	more / a lot of <u>water</u> lost in sweating / breathing		1
	replace water / prevent dehydration		1
total			5

## 3415F Q8

question	answers	extra information	mark
(a)(i)	increases		1
(ii)	decreases		1
(b)	any <b>two</b> from:  <ul style="list-style-type: none"> <li>• competition for water</li> <li>• competition for ions / minerals / salts / nutrients</li> <li>• competition for light</li> </ul>	accept correct named example do <b>not</b> accept food do <b>not</b> accept <u>all</u>  ignore space	2
(c)	kills / harms other / named organisms		1
total			5

## 3415F Q9

question	answers	extra information	mark
(a)	<b>X</b> (no mark) <b>X</b> is more visible <b>or</b> <b>Y</b> is more camouflaged		1
(b)(i)	so camouflage not changed <b>or</b> so not easier to see		1
(ii)	25 7		1 1
(iii)	any <b>one</b> from: • eaten (by birds) / died • mixed in with large number of unmarked moths • moved away		1
(c)(i)	DNA		1
(ii)	the <u>gene</u> / <u>allele</u> for being dark / dominant		1
total			7

## 3415F Q10

question	answers	extra information	mark
(a)(i)	9		1
(ii)	1 and 3 <b>or</b> 3 and 6 <b>or</b> 3 and 7 <b>or</b> 6 and 7	both numbers must be correct for a mark  accept correctly named bones instead of numbers	1
(iii)	tick in box – muscles cannot push bones		1
(b)	any <b>three</b> from:  A is balanced about centre of gravity  head held upwards not forwards  abdomen not bulging  back straight <b>or</b> shoulders not rounded	accept weight of body more evenly spread  accept head held high or looking straight ahead <b>or</b> neck is straight / not bent  accept stomach for abdomen	3
total			6

## 3415F Q11

question	answers	extra information	mark
(a)	tick in box – amnion		1
(b)	substances can diffuse / pass	accept correctly named substances accept direction of movement if correct	1
(c)	stops passage of pathogens (from mother to embryo) <b>or</b> stops clotting of blood <b>or</b> agglutination <b>or</b> no antigens / no antibodies / no hormones passed	accept germs  accept stops passage of harmful substances  accept maternal blood pressure higher than embryonic pressure  accept mother and baby might have different blood groups / blood types	1
total			3

## 3415F Q12

question	answers	extra information	mark
(a)	produce sperm <b>or</b> produce hormones	accept store sperm if hormone named must be correct	1
(b)	<b>B</b> – produces a fluid (for sperm to travel) <b>or</b> make motile <b>or</b> provide nutrients <b>or</b> prevent drying		1
	<b>C</b> – sperm <u>pass along</u> tube to end of penis	answer must imply that sperm pass along C	1
total			3

## 3415F Q13

question	answers	extra information	mark
(a)	overlap	if a figure is quoted then must be correct ie between 31000 and 33000	1
(b)	any <b>two</b> from: could make good tools for hunting made clothes / used clothes / used fur / used animal skins discovered how to use fire used shelter wide or bulbous nose	do <b>not</b> accept made shelters accept small facial features	2
(c)	any <b>two</b> from: more people to hunt food co-operate in hunting started to grow crops Homo sapiens more intelligent	accept find / gather food (accept once only) accept find / gather food (accept once only) accept started to keep animals accept better developed brain <b>or</b> communication / stored knowledge do <b>not</b> accept large brain	2
(d)	needed more food than Homo sapiens		1
total			6

## 3415F Q14

question	answers	extra information	mark
(a)	Quality of written communication: for correct sequence shown for stages in action of heart of atrium action followed by ventricle action		1
	any <b>two</b> from:  atrium contracts to force blood out / into ventricle  ventricle contracts to force blood into artery  cuspid valve closes to prevent backflow of blood <b>or</b> blood returning to atrium  accept semi-lunar valve (opens) for blood to pass		2
(b)	any <b>three</b> from:  more blood pumped / blood pumped faster  more oxygen to muscles  reduces / stops lactic acid forming  increased removal of carbon dioxide from muscles	accept heart can pump / contract harder / faster / better  accept glucose for oxygen  accept stops fatigue / tiring <b>or</b> muscles can work longer <b>or</b> stronger <b>or</b> muscles more powerful <b>or</b> increased aerobic respiration	3
total			6



## 3415F Q15

question	answers	extra information	mark
(a)(i)	protease	accept peptidase <b>or</b> named protease e.g. pepsin / trypsin allow 'proteinase'	1
(ii)	amino acids	accept peptides / polypeptides / peptones	1
(b)	points plotted accurately	$\pm \frac{1}{2}$ square deduct <b>1</b> mark per error	2
	best fit curve <b>or</b> ruled point-to-point	if double line within $\frac{1}{2}$ square  allow sharp apex  do <b>not</b> allow single straight line  if no points line defines points  if (5,0) not plotted only penalise <b>1</b> mark  bar graph wide bars – <b>no</b> marks  bar graph $\pm \frac{1}{2}$ square max <b>2</b> for points	1
(c)(i)	2 <b>or</b> correct from candidate's graph	$\pm \frac{1}{2}$ square	1
(ii)	stomach		1
(d)	proteins are large / product is small		1
	proteins (may be) insoluble / product is soluble		1
	cannot be absorbed / cannot enter blood <b>or</b> cannot pass through gut lining	accept reverse referring to product	1
total			10

## 3415F Q16

question	answers	extra information	mark
(a)(i)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• <u>chemical</u> messenger</li> <li>• <u>chemical</u> / <u>substance</u> released in one part to have effect elsewhere in body</li> <li>• <u>chemical</u> / <u>substance</u> which affects another / target organ / tissues / cells</li> </ul>	allow <u>chemical</u> from <u>endocrine</u> gland	1
(ii)	in blood / circulatory system / any named part including plasma	extra wrong answer would cancel example <b>not</b> red blood cells	1
(b)	Quality of written communication: correct use of at least two relevant scientific terms spelt phonetically	e.g. pregnancy, ovulation, FSH, oestrogen, progesterone, ovary, follicle, circulation, thrombosis, feminisation, sperm count, STD Q ✓ or Q X	1
	any <b>three</b> from: <u>Oral contraceptives</u> : (benefit) <ul style="list-style-type: none"> <li>• prevent (unwanted) pregnancy <b>or</b> prevent egg release</li> <li>• regulate menstrual cycle / periods</li> </ul> (problems) <ul style="list-style-type: none"> <li>• prolonged use may prevent later ovulation / cause infertility</li> <li>• named side-effect on female body e.g. circulatory problems / weight gain / nausea / headache / breast cancer / mood swings</li> <li>• increased promiscuity / increase in STD's / STI's</li> <li>• named side-effect on environment e.g. feminisation of fish <b>or</b> lowered sperm count in human males</li> </ul> <u>Fertility drugs</u> : (benefit) <ul style="list-style-type: none"> <li>• can enable woman to have children <b>or</b> to become pregnant <b>or</b> stimulates egg release</li> </ul> (problem) <ul style="list-style-type: none"> <li>• multiple births</li> </ul>	for full marks must score at least <b>one</b> re contraceptives <b>and</b> at least <b>one</b> re fertility drugs  if unclear which type of hormone maximum <b>2</b> marks from 3	3
total			6

## 3415F Q17

question	answers	extra information	mark
(a)	burning fossil fuels / named example	accept <u>driving</u> cars / lorries etc burning fuels in power stations ignore combustion unqualified do <b>not</b> accept catalytic converter on its own <b>or</b> emissions from power stations	1
(b)(i)	pollutants / smoke <u>breathed in</u>		1
(ii)	SO <sub>2</sub> and deaths rise (and fall) at same times <b>or</b> SO <sub>2</sub> and deaths parallel each other / show same pattern		1
(iii)	no – could be due to some other factor / pollutant / to smoke <b>or</b> correlation not precise / described	explanations must come to a conclusion named examples must be plausible allow ‘coincidence’	1
total			4

## 3415F Q18

question	answers	extra information	mark
(a)	A = protein (coat)	accept capsid / capsomere	1
	B = DNA / gene(s) / genetic material / nucleic acid	allow RNA do <b>not</b> allow chromosome	1
(b)(i)	any <b>two</b> from:  <ul style="list-style-type: none"> <li>• skin</li> <li>• scabs / clot</li> <li>• mucus</li> <li>• stomach acid / gut protease</li> </ul>	allow tears	2
(ii)	diagram shows extensions of intact cell membrane around viruses		1
(iii)	antibodies	allow enzymes re (ii) allow interferon ignore antitoxins / proteins	1
(c)	<u>virus</u> is transferred		1
	(virus in) blood / body fluids – transfer (via needles)		1
total			8

## 3415F Q19

question	answers	extra information	mark
(a)(i)	lower – <b>B</b> loses less (water / mass) than <b>C</b> <b>or</b> described in terms of petroleum jelly	accept converse re Leaf <b>C</b>	1
(ii)	yes - <b>B</b> and <b>C</b> lose less than <b>D</b> <b>or</b> <b>B</b> and <b>C</b> lose more than <b>A</b> <b>or</b> <b>D</b> loses the <u>most</u> <b>or</b> <b>A</b> loses the <u>least</u>	do <b>not</b> accept just ‘all leaves lose some weight’	1
(b)(i)	<b>X</b> = stoma  <b>Y</b> = guard cell	accept stomata / stomatal pore do <b>not</b> accept air space	1  1
(ii)	petroleum jelly blocks stomata / pores <b>or</b> petroleum jelly prevents water loss <b>or</b> petroleum jelly waterproofs  water (mainly) lost via stomata / pores / <b>X</b> <b>or</b> stomata on lower surface only	allow pores are blocked in <b>B</b>	1  1
total			6

## 3415F Q20

question	answers	extra information	mark
(a)	(calcium) – replaces calcium lost from bone <b>or</b> stops loss of calcium from bone	accept bones made of calcium  accept strengthen / harden bones <b>or</b> makes less porous <b>or</b> needed for growth / repair of bones	1
	(vitamin D) – for absorption of calcium	accept for the use of calcium in the body	1
(b)	ligament broken or torn or damaged	accept partly broken <b>or</b> partly torn  do <b>not</b> allow if mention both the torn ligament and the broken bone	1
(c)	bones not held together	accept bones can move too much <b>or</b> bones pulled apart <b>or</b> dislocation possible	1
	damage to synovial membrane <b>or</b> synovial membrane produces fluid	accept swelling occurs	1
total			5

## 3415F Q21

question	answers	extra information	mark
(a)(i)	atherosclerosis	correct spelling <b>or</b> phonetically correct	1
(ii)	less blood <u>reaches heart</u> (should not imply general circulation)  less oxygen reaches heart <b>or</b> less respiration <b>or</b> less energy <b>or</b> not enough energy (for heart muscles) <b>or</b> <u>heart cells</u> die	accept heart muscles  accept heart muscles accept no energy (ignore reference to food)  do <b>not</b> accept build up of blood pressure	1  1
(b)(i)	should not base evidence on small numbers <b>or</b> small sample may be unrepresentative	accept remove effect of anomalous results or data more accurate / more reliable or gives more representative sample or gives big spectrum or cover a good range of population	1
(ii)	older person may have a low cholesterol level <b>or</b> has eaten to reduce cholesterol <b>or</b> medicine to reduce blood pressure	accept younger person may have high cholesterol level <b>or</b> eat wrong diet accept results show averages <b>or</b> older person may be below average accept son may have a heart defect <b>or</b> factors other than age must be considered <b>or</b> mention other factors such as stress / activity levels <b>or</b> cholesterol level depends on diet not on age <b>or</b> there are other causes of heart attack than cholesterol accept other relevant factors	1
(iii)	women aged 65 – 74	both points are required for the mark	1
total			6

## 3415F Q22

question	answers	extra information	mark
(a)(i)	A – (glands or cells which) produce milk	accept where milk is stored	1
	B – has pores so milk can pass out	accept where milk is released	1
	nipple provides contact for baby's mouth	accept suckling the nipple stimulates milk flow / secretion of prolactin	
(ii)	any <b>two</b> :  milk should have protein reduced or used diluted  needs to have carbohydrate / sugar added  vitamin C <b>or</b> orange juice should be added	accept cow's milk has too much protein  accept cow's milk does not have enough carbohydrate / energy  accept cow's milk is low in vitamin C  ignore references to regulated or modified	2
(b)	baby's head turns towards finger / stimulation <b>or</b> starts sucking on finger		1
	enables baby to find the breast / nipple / mammary gland for feeding		1
total			6



## 3415F Q23

question	answers	extra information	mark
(a)	38.09 <b>or</b> 38.1 (%)	accept range 35.8 – 40.4  accept showing 145 (144 – 146) – 105 (104 – 106) <b>or</b> correct calculation with incorrect answer <u>for 1 mark</u>	2
(b)	any <b>two</b> from:  • arms shorter in relation to legs  • brain size bigger <b>or</b> speech area of brain better developed  • hunted in organised groups  • better use of hands <b>or</b> used tools <b>or</b> made tools <b>or</b> used fire	accept walking upright <b>or</b> bipedal <b>or</b> standing erect  accept better speech <b>or</b> able to communicate (better)	2
total			4

## 3415F Q24

question	answers	extra information	mark
(a)	<p><b>Quality of written communication:</b> ideas given in a <u>sensible order</u></p> <p>any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• microorganisms / bacteria / fungi / saprotrophs</li> <li>• digest / break down organic matter / leaves / decompose / reference decomposers / decay / rot</li> <li>• use of enzymes / correct named example</li> <li>• absorption by <u>diffusion</u> / <u>active transport</u></li> <li>• respiration / combustion</li> <li>• release of carbon dioxide</li> <li>• CO<sub>2</sub> can be used (by trees) in photosynthesis</li> </ul>	<p>broken down giving products (could be CO<sub>2</sub>, minerals or gas) (used by trees)</p> <p>Q ✓ or Q X</p> <p>accept saprophytes / saprobionts / detritivores (named)</p> <p>must be of breakdown <u>products</u></p> <p>do <b>not</b> accept CO<sub>2</sub> taken in by roots</p>	<p>1</p> <p>3</p>
(b)	<p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• warmth / suitable temperature</li> <li>• damp / water / rain / humid / moisture</li> <li>• oxygen</li> <li>• suitable pH</li> </ul>	<p>do <b>not</b> accept heat / hot weather</p>	2
total			6