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Edexcel GCSE

Biology A 1520

Paper 4H

Summer 2006

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Mark Scheme

Edexcel GCSE

Biology A 1520

N26713A

USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
   * how individual marks are to be awarded
   * the total mark for each question
   * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
3. / means that the responses are **alternatives** and either answer should receive full credit.
4. ( ) means that a phrase/word is not essential for the award of the mark but helps the examiner to get the sense of the expected answer.
5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.
6. OWTTE (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.
7. 'Ignore' means that this answer is not worth a mark but does not negate an additional correct response.
8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

MARKING

1. You must give a tick (in red) for every mark awarded. The tick must be placed on the script close to the answer. The mark awarded for part of a question should be written in the margin close to the sub-total.
2. The sub-total marks for a question should be added together and the total written and ringed at the end of the question then transferred to the front of the script.
3. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
4. **Do not** award marks for repetition of the stem of the question.
5. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

AMPLIFICATION

1. In calculations, full credit must be given for a bald, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

QUALITY OF WRITTEN COMMUNICATION

Students will be assessed on their ability to:

present relevant information in a form that suits its purpose

ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear

use a suitable structure and style of writing.

1. An explanation to include:
three from
before
1. **one** virus attaches / links / binds to bacterium /eq;
2. bacterium penetrated / membrane penetrated /eq;
[Ignore wall / virus enters]
3. DNA enters / RNA enters / nucleic acid / eq;
[Reject whole virus / capsid enters]
4. Viral DNA controls the production of proteins / DNA by the bacterium /eq;
5. capsids formed / protein coats formed / new viruses formed /eq;

plus two from
after
1. cell membrane splits /cell burst / bacterium splits / eq;
2. viruses leave /eq;
3. viruses attack new cells /eq;

3

1

plus one communication mark for using a suitable structure and style of writing (sentences / flow diagram / bullet points)

Total 6 marks

2. (a)

description of region of graph	letter
most nutrients were available	(A)
waste products excreted by bacteria were at their highest	C;
rate of production of bacteria = rate of death of bacteria	B;
nutrients were running out rapidly	C;
conditions were perfect for the growth of the bacterial population	A;

4

(b) (i) An explanation to include:
1. to survive / to continue the species /eq;
2. in unfavourable conditions / in bad environment /eq;

2

(ii) Any two from:
1. low temperature /eq;
2. high temperature /eq;
3. change in pH /extremes in pH / comparator / eq;
4. desiccation /eq;
5. lack of nutrients;

[Maybe two on one line, but check the third response does not negate]

2

Total 8 marks

3. (a)

name of tank	number of tank
aerobic digester tank	2;
anaerobic digester tank	4;
first settlement tank	1;
second settlement tank	3;

4

(b) **X** near outfall of river /eq; 1

(c) methane; 1

(d) **Either**:

tank 2 / aerobic tank;
breakdown greatest with oxygen /
microbe growth greatest with oxygen /eq;

or:

tank 4 / anaerobic tank;
breakdown greatest without oxygen /
oxygen inhibits the organisms / eq; 2

(e) A suggestion to include:
1. reduced breakdown of sewage / organic matter / eq;
2. bacteria are destroyed /eq; 2

(f) An explanation to include:
1. it contains nitrates / phosphates / ammonium / eq;
2. which are fertilisers /manure / eq; 2

Total 12 marks

4. (a) (i) An explanation to include:
1. heat to a high temperature / 70 °C – 90 °C for a short time / seconds; 2
[Ignore immediately]
2. then cool rapidly;

(ii) An explanation to include:
1. kill bacteria / kill microorganisms /eq;
[Reject germs]
2. which would compete with the added bacteria / otherwise process would be contaminated / other bacteria would use the nutrients / not kill the useful ones / eq; 2

(b) An explanation to include:
1. optimum temperature for the growth / multiplication / reproduction of bacteria /eq;
2. (optimum temperature) for enzymes / fermentation; 2

(c) An explanation to include three from:
1. *Lactobacillis bulgaricus* converts **lactose** /**milk** sugars / eq;
2. into lactic acid / lowers pH /eq;
3. uses formic acid + carbon dioxide /eq;

4. *Lactobacillis thermophilus* converts milk protein/ converts casein /eq;
5. into acetaldehyde / gives yoghurt a buttery taste /eq;
6. makes formic acid + carbon dioxide /eq;

3

(d) An explanation to include two from:
1. build up of acid / lowering of pH / toxic build up /eq;
2. less nutrients /eq;
3. temperature lowered / cooled;
4. reduction in enzyme activity; 2

[Ignore denatured]

(e) yoghurt still contains living / active bacteria /eq; 1

Total 12 marks

5. (a) Any two from:
1. antibiotics / antibodies;
2. antiseptics;
3. sterilisation / autoclave / radiation / pasteurisation;
4. disinfectants; 2

(b) A calculation to include:
1. 200 + 100 + 300 = 600 people in hospital;
2. 30% of 600 = 180 carriers; 2

[Bald, correct answer scores 2 marks]
[Allow ecf from point 1. ie accept 30% of candidate's population estimate, if incorrect, for 1 max]

(c) An explanation to include three from:
1. bacteria mutate /eq;
2. antibiotic over-used / antibiotic course not finished /eq;
3. some selected against / some die out /eq;
4. some survive / selected for /eq;
5. these are resistant to antibiotic / the antibiotic has no effect /eq;
6. they go on to pass resistance on to next generation /eq;
7. rapid reproductive rate linked to rapid evolution of bacteria /eq; 3

[Reject reference to immunity]

1

plus one communication mark for presenting relevant information in a form that suits its purpose

(d) (i) in a Petri dish / in a plate /on agar / nutrient medium / eq; 1

(ii) cannot escape into air / can pass to a (technician) / no risk of contamination (to culture) / eq; 1

(iii) use of antibiotic / methicillin /monoclonal antibodies / markers / eq;
susceptible dies / MRSA survives /markers show up / eq; 2

(iv) A suggestion to include two from:
1. new test identifies carrier more quickly;
2. so carriers can be treated with antiseptics /
so MRSA can be destroyed /
a carrier with MRSA excluded from hospital /
isolate carrier /ORA /eq;
[Ignore antibiotic]
3. so less chance of MRSA spreading /ORA /eq; 2

Total 14 marks

6. (a) (i) An explanation to include two from:
1. weeds killed /eq;
2. so less competition /eq;
3. for water / light / minerals /eq;
4. so more growth for crop; 2
[Ignore nutrients]

(ii) An explanation to include two from:
1. weeds have the non-resistance gene (to glyphosphate) /eq;
2. enzyme is inhibited or stopped /eq;
3. so (essential) amino acids not made /eq; 2

(iii) (non-resistance) gene / enzyme not found in humans / animals /
animal consumers / eq; 1

(iv) more herbicide put on plants /
there may be more residues in plants or foods /
herbicide may pass through food chains /
GM plants may breed with weeds /
weeds evolve resistance as a result of more /
increased use of herbicides /
pollen may escape out of fields/
can only get seeds from the company/
need a licence to grow /
cannot use the herbicide to wipe out crop if it becomes a weed /eq; 1
[Ignore biodiversity]

(b) A suggestion to include:
1. increased percentage of C (with both genes) /eq;
2. they would have greater yield /eq; 2

Total 8 marks

TOTAL MARK 60