Unit 2 Key Area 6 Environmental control of metabolism

Mark Scheme

1. B
2. D
3. C
4. B
5.

a	20	1
b	increase - people becoming complacent about hand washing or bacteria becoming resistant OR no change - everyone now using procedure OR decrease - increased uptake of procedure	1
c	Clostridium increases (1) Staphylococcus remains fairly constant (1)	2
d	Conclusion - effective (1) Justification - although percentage of cases remains similar number of cases falls (1)	2

6.	a	Name: Lag phase (1) Explanation: (time required for) DNA replication/enzyme induction/enzyme production OR Cells can't divide until DNA replicates /enzymes induced (1) NB: Correct explanation for lag phase with wrong name = 1 mark	2	NOT - log (check handwriting) NOT - lagging NOT - enzymes are starting to work NOT - enzymes are being switched on NOT - cells are getting used to the environment / acclimatising NB: Incorrectly named phase with matching explanation = 0 marks
	b i	Stationary	1	NOT - 'C' alone
	b ii	Kills/inhibits/toxic to/prevents growth of…. other bacteria AND reduces/eliminates competition from other bacteria OR allows it to outcompete other bacteria OR Eliminates interspecific competition	1	NOT - kills other bacteria alone
	c	Cell number decreases/line goes down… during/in …. death phase/phase D/at the end/ eventually	1	

7.	a i	Protein synthesis / translation / gene expression	1	
	a ii	1650	1	
	a iii	Microbes bacteria/other yeast/other cells may compete with yeast/use up nutrients /compete for resources. OR Microbes/bacteria/other yeast/ other cells may reduce productivity / growth/yield of the culture/yeast. OR Microbes/bacteria/other yeast/other cells may cause disease/health risks/harm humans.	1	NOT - to ensure only yeast grows NOT - affect growth of the culture / yeast. NOT - prevent health risks without mention of microbes.
	a iv	Add buffer / acid / alkali	1	
	b	A Phase - Lag Description -Enzymes induced. B Phase - Stationary Description - Culture becomes depleted of nutrients/substrates/ resources/oxygen OR Secondary metabolites produced/build up OR Toxic metabolites/waste accumulate	2	NOT- enzymes are starting to work. NOT- enzymes are being switched on. NOT- cells are getting used to the environment. NOT- no cell division alone. NOT- birth rate = death rate alone.
	c	Introduce genes/sequences that prevent survival (in external environment)/allow them to only survive in lab.	1	

8.

(a)	(i)	Stationary	1	
	(ii)	Reduces/eliminates/prevents/ competition. OR Allows it to out-compete other bacteria/micro-organisms. OR Kills other bacteria/micro-organisms which might damage the plant thereby affecting/reducing *Streptomyces* food supply.	1	NOT - "Kills other bacteria/micro-organisms" alone.

(b)

(i)	Fusidic acid/gentamycin.	1	
(ii)	Streptomycin is less effective than fusidic acid/gentamycin/others of the same concentration.	1	Streptomycin ***must*** be mentioned to gain the mark. Survival of bacteria is not equivalent to effectiveness of antibiotic. Conclusion must relate to aim.