

Topic 6 Biology

Booklet 3 of 3

Revision Questions

Antibiotics & TB

MARK SCHEME

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> 1. idea of antibiotic is used to {control / kill / prevent reproduction of / eq} bacteria ; 2. bacteriostatic prevent {reproduction / division / multiplication / growth / eq} of bacteria; 3. bactericidal {destroy / kill / eq} bacteria ; 	(3)

Question Number	Answer	Mark
8(b)	<ol style="list-style-type: none"> 1. idea that both more or less the same at {start / end} ; 2. idea that B is higher than A most of the time ; 3. B rises and then falls and A falls and then rises / eq ; 4. ref to both falling after April 04 / eq ; 5. comparative use of figures ; 	maximum (3)

Question Number	Answer	Mark
8(c)(i)	D {has the lowest rate of MRSA infection (throughout) / is consistent / has less fluctuation} / eq ;	(1)

Jan 2010

Question Number	Answer	Mark
8(c)(ii)	<ol style="list-style-type: none"> 1. D has {stricter / eq} hygiene practices / eq ; 2. ref to hand washing regimes for {doctors / nurses / medical staff / visitors} ; 3. particularly when dealing with open {wounds / eq} / eq ; 4. ref to wearing suitable clothing ; 5. ref to antiseptic (solutions) readily available ; 6. named antiseptic e.g. gels, pastes, alcohol rubs ; 7. ref to {isolation of suspected cases / screening of admissions} / eq ; 8. D {controls / monitors} use of antibiotics / eq ; 9. fewer {patients / visitors} passing in and out ; 	<p>maximum (3)</p>

Jan 2010

1001
6B10

Question Number	Answer	Mark												
8(a)	<table border="1"> <thead> <tr> <th>Description</th><th>Name of structure</th><th>P, E or B</th></tr> </thead> <tbody> <tr> <td>Enclosed by outer smooth membrane inner membrane folded forming cristae</td><td>Mitochondrion / mitochondria</td><td>E / eukaryotic</td></tr> <tr> <td>Long strand-like structure extending out from the cell Used for locomotion</td><td>Flagellum / flagella</td><td>B / both</td></tr> <tr> <td>Small, circular loop of double-stranded DNA</td><td>plasmid</td><td>P / prokaryotic</td></tr> </tbody> </table> <p>1 mark for any two correct cells ;;;</p>	Description	Name of structure	P, E or B	Enclosed by outer smooth membrane inner membrane folded forming cristae	Mitochondrion / mitochondria	E / eukaryotic	Long strand-like structure extending out from the cell Used for locomotion	Flagellum / flagella	B / both	Small, circular loop of double-stranded DNA	plasmid	P / prokaryotic	(3)
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Question Number	Answer	Mark
8(b)(i)	bactericidal ;	(1)

Question Number	Answer	Mark
8(b)(ii)	<ol style="list-style-type: none"> 1. cell wall {weaker / cannot form properly / eq} ; 2. {cell / cell wall} bursts (easily) / eq ; 3. during division / eq ; 	max (2)

June 2010

Question Number	Answer	Mark
8(b)(iii)	<ol style="list-style-type: none">1. reference to antibiotic acting as selective pressure ;2. reference to some bacteria resistant (to antibiotic) ;3. idea that resistant bacteria survive and {reproduce / pass on resistance / pass on gene / eq};4. idea that antibiotic no longer effective ;5. reference to some infections cannot be treated with antibiotics ;	max (2)

June 2010

Question Number	Answer	Mark
8(c)	<ol style="list-style-type: none"> 1. idea of bacteria distributed evenly / description of technique e.g. lawn spreading ; 2. description of method used to apply different antibiotics at known positions e.g. multidisks, wells in agar ; 3. reference to control of antibiotic concentration ; 4. reference to {sterile / aseptic} technique ; 5. reference to incubation at a suitable temperature ; 6. description of how effect is assessed e.g. measure {clear area / inhibition zone / eq} ; 7. reference to replication (with same bacterium) ; 8. reference to repetition with different bacteria ; 	<p>max (4)</p>

June 2010

Question Number	Answer	Mark																
2(a)	<table><tr><th>Feature</th><th>Bacteria only</th><th>Viruses only</th><th>Both bacteria and viruses</th></tr><tr><td>Glycogen granules</td><td><div>X</div></td><td><div></div></td><td><div></div></td></tr><tr><td>Nucleic acids</td><td><div></div></td><td><div></div></td><td><div>X</div></td></tr><tr><td>Protein coat (capsid)</td><td><div></div></td><td><div>X</div></td><td><div></div></td></tr></table> <p>1 mark per row ;;;</p>	Feature	Bacteria only	Viruses only	Both bacteria and viruses	Glycogen granules	<div>X</div>	<div></div>	<div></div>	Nucleic acids	<div></div>	<div></div>	<div>X</div>	Protein coat (capsid)	<div></div>	<div>X</div>	<div></div>	(3)
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Question Number	Answer	Mark
2(b)(i)	<ol style="list-style-type: none"> 1. viruses (and bacteria) involved ; 2. (usually) antibiotics {are only effective against bacteria / do not affect viruses / eq} ; 3. {other medication / eq} needed to deal with viruses / eq ; 	max (2)

Question Number	Answer	Mark
2(b)(ii)	<ol style="list-style-type: none"> 1. both enrofloxacin and florfenicol named ; 2. idea of {(high) effectiveness / eq} against all three bacteria / eq ; 3. above {80% / 83%} / eq / average above 90% / eq ; 	(3)

Jan 2011

Question Number	Answer	Mark
2(b)(iii)	<ol style="list-style-type: none"> 1. idea that antibiotic used is {most effective / eq} (against the known bacterium) ; 2. idea that none of the antibiotics is 100% effective / some bacteria {survive / eq} ; 3. some bacteria {are resistant / eq} ; 4. idea of resistant strain {develops / prevented} ; 	<p>max (3)</p>

Jan 2011

Question Number	Answer	Mark
4(a)(i)	Any characteristic symptom of TB e.g. tubercles, bloody sputum, (general)body tissue wastage ;	(1)

Question Number	Answer	Mark
4(a)(ii)	D ;	(1)

Question Number	Answer	Mark
4(a)(iii)	<ol style="list-style-type: none"> 1. idea of {bacterium / eq} recognised as {non-self / eq} ; 2. reference to labelling of bacteria by B {lymphocytes / cells} ; 3. phagocytosis / phagocytic / phagocyte ; 4. descriptive detail of phagocytosis (involving {bacterium / eq}) ; 5. reference to formation of vacuole ; 	max (3)

Question Number	Answer	Mark
4(a)(iv)	<ol style="list-style-type: none"> 1. {kills / eq} {bacteria / eq} in {stomach / mouth / saliva / gastric juice} ; 2. (by) {(hydrochloric) acid / lysozyme} ; 	(2)

Jan 2011

Question Number	Answer	Mark
*4(b)QWC	<p>(QWC - Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <p>Supporting the hypothesis:</p> <ol style="list-style-type: none"> 1. both HIV and TB infection rates rise and then fall / eq ; 2. both HIV infection and TB infection increase {from 1990 to 2000 / for the first 10 years} / eq ; <p>Not supporting the hypothesis:</p> <ol style="list-style-type: none"> 3. TB infection falls from 2000 onwards but HIV continues to rise (until 2004) / eq ; 4. different {parameters / measures / variables / eq} for the two infections / eq ; <p>General points:</p> <ol style="list-style-type: none"> 5. idea of {more {data / information / eq} is needed / other factors (may be) involved} ; 6. reference to need for statistical {analysis / test} ; 7. such as correlation {data / test / named example} ; 8. there is no data that {links HIV infection with TB infection / shows that people with HIV also have TB / shows causal relationship / eq} ; 	<p>max (4)</p>

Jan 2011

Question Number	Answer	Mark
5(a)(i)	<ol style="list-style-type: none"> 1. {competition / eq} for nutrients ; 2. {competition / eq} for space ; 3. {secretion / eq} {chemicals / substances / lysozyme / eq} OR affects {pH / eq} ; 4. {stimulation / eq} of (skin) immune system / eq ; 	(2)

Question Number	Answer	Mark
5(a)(ii)	A ;	(1)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> 1. idea that influenza may allow development of other diseases e.g. opportunistic infections ; 2. antibiotics will {kill / inhibit growth of / eq} bacteria ; 	(2)

Question Number	Answer	Mark
5(c)(i)	<p>correct answer 37.2 / 37.17 / 37 (%) gains 2 marks</p> <ol style="list-style-type: none"> 1. $(226 - 142) / 84$; 2. $\div 226$ to give 37.2 / 37.17 / 37 (%) ; 	(2)

Question Number	Answer	Mark
5(c)(ii)	<ol style="list-style-type: none"> 1. yes ; 2. idea that if current rate continues / eq ; 3. idea of achieving lower than the target / eq; 4. credit use of supporting figures ; 	(3)

Question Number	Answer	Mark
5(c)(iii)	<ol style="list-style-type: none"> 1. reference to some bacteria {can resist / are resistant to} antibiotics ; 2. idea of {resistance being genetic / can be passed on} ; 3. reference to MRSA / other named example ; 	(2)

Question Number	Answer	Mark																
5(a)	<table><tr><th>Feature</th><th>Bacteria only</th><th>Viruses only</th><th>Both bacteria and viruses</th></tr><tr><td>Nucleic acid</td><td></td><td></td><td>✓</td></tr><tr><td>Cytoplasm</td><td>✓</td><td></td><td></td></tr><tr><td>Protein capsid</td><td></td><td>✓</td><td></td></tr></table> <p>1 mark each correct row ;;;</p>	Feature	Bacteria only	Viruses only	Both bacteria and viruses	Nucleic acid			✓	Cytoplasm	✓			Protein capsid		✓		(3)
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Question Number	Answer	Mark
5(b)(i)	<ol style="list-style-type: none"> idea of (SCAG is) caused by {a bacterium / bacteria} ; antibiotics {kill / stop reproduction / eq} of bacteria / are {bactericidal / bacteriostatic} ; 	(2)

Jan 2012

Question Number	Answer	Mark
*5(b)(ii) QWC	<p>Spelling of technical terms must be correct and the answer must be organised in a logical sequence</p> <ol style="list-style-type: none"> 1. as age increases, acid secretion decreases / eq ; 2. as age increases (above 30) , stomach cancer increase / eq ; 3. as acid secretion decreases (below 120), stomach cancers increases / eq ; 4. idea that the {higher age groups (51+) have low acid and high cancer / lower age groups (up to 30) have high acid and low cancer} ; 5. Idea of {acid / low pH} (in stomach) kills {bacteria / <i>Helicobacter</i>} ; 6. reference to development of SCAG {inhibited / prevented / eq} (by low pH / more stomach acid) ; 7. idea of age affects the immune system ; 8. idea that the older you are acid-producing cells are less effective e.g. fewer acid-producing cells / cancer cells replace the acid-producing cells ; 9. idea that {acid / low pH} destroys cancer cells ; 10. idea that mutations (leading to cancer) more likely to occur with age ; 	(5)

Jan 2012

Question Number	Answer	Additional guidance	Mark
1(a)(i)	1. reference to {death / killing / destroying / eq } (of bacteria cells) ; 2. idea that {bacteria / cells} burst ;	1. Ignore reference to stopping growth 2. Accept lysis, loss of osmotic control	(2)

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	1. reference to cells cannot {reproduce / increase in number / produce new cells / multiply / replicate / eq} ; 2. idea of no (cell) division ;	2. Accept no binary fission	(2)

Question Number	Answer	Additional guidance	Mark
1(b)(i)	1. (A and C resistant as) no {clear zone / zone of inhibition / eq} around A and C ; 2. idea that {clear zone / eq} indicates where antibiotic {inhibits growth / kills bacteria / eq} ; 3. {clear zone / eq} around B {smaller/ eq} than clear zone around D ; 4. idea of {size / diameter / width / eq} of clear zone indicates {effectiveness / eq} ; [check diagram for appropriate labels]	1. Accept a clear description of this area around the disc 2. Accept converse 3. Accept converse	(3)

Question Number	Answer	Mark
1(b)(ii)	C reliability ;	(1)

Question Number	Answer	Mark
1(b)(iii)	D validity;	(1)

Question Number	Answer	Additional guidance	Mark
1(c)	<ol style="list-style-type: none"> 1. reference to hospitals {having / changing / eq } a {code of practice / protocol / policy / standards / eq} (for dealing with hospital acquired infections) ; 2. idea of clothing rules for hospital workers ; 3. reference to <u>improved</u> laundry of bed linen e.g. {<u>increased</u> frequency / higher washing temperature / eq} ; 4. reference to use of special {pillow cases / treatment of pillow cases} e.g. microfilters, treated with antibacterials, sterilisation, disposable pillow cases ; 5. reference to use of special procedures when carrying {pillow cases / bed linen} to laundry e.g. sealed plastic bags ; 6. screening of patients / isolation of infected patients / eq ; 7. idea of hand washing regimes / eq ; 	<p>1. Allow references to pillows for pillow cases throughout</p> <p>3. Allow pillow cases should be washed daily</p> <p>7. Allow hands should always be washed</p>	(3)

Question Number	Answer	Additional Guidance	Mark
6(a)	<ol style="list-style-type: none"> 1. bacteria have DNA, viruses have DNA or RNA ; 2. idea that bacteria have {circular / eq} genetic material, viruses have {linear / straight} ; 3. bacterial DNA is double-stranded, viral {DNA / RNA} is single (or double) stranded / eq; 4. bacteria (may) have plasmids, viruses do not have plasmids / eq; 	<p>NB piece answers together throughout</p> <p>Do not accept in context of plasmid</p>	(2)

Question Number	Answer	Additional Guidance	Mark
6(b)(i)	<ol style="list-style-type: none"> 1. reference to {phagocytosis / endocytosis / engulfing} ; 2. credit details of phagocytosis ; 3. reference to bacterium inside a {vacuole / vesicle / phagolysosome} ; 	<p>eg formation of {pseudopodia / membrane extensions around bacteria} / cytoplasmic streaming / binding to bacteria</p> <p>Not phagolysosome</p>	(2)

Question Number	Answer	Additional Guidance	Mark
6(b)(ii)	<ol style="list-style-type: none"> 1. idea that bacteria need to be accessible to antibiotics ; 2. idea of bacteria inside macrophages ; 3. reference to waxy layer of (these) bacteria ; 4. idea that (bacteriostatic) antibiotics affect dividing bacteria; 5. reference to antibiotic resistance (of these bacteria) ; 	Not bacteriocidal antibiotics	(2)

Question Number	Answer	Additional Guidance	Mark
6(b)(iii)	<ol style="list-style-type: none"> 1. idea of {dead / attenuated / eq} {organisms / pathogen / bacterium / eq} put into person; 2. reference to (stimulation of) {specific / primary} (immune) response ; 3. credit details of T helper cell activation ; 4. credit details of B cell activation ; 5. credit details of T killer cell activation ; 6. reference to production of memory cells ; 	<p>NB not simply crediting ref to vaccination as in stem of question Accept antigen</p> <p>eg macrophages as APCs</p> <p>eg involvement of cytokines, B cells as APCs</p> <p>eg involvement of cytokines, infected cells as APCs</p>	(3)

Question Number	Answer	Additional Guidance	Mark
5 (b)(i)	<ol style="list-style-type: none"> idea that bacteria are resistant to fewer {antibiotics / antibiotic combinations} (in 2006 than 2007) ; in both years there are resistant strains to {streptomycin / INH + rifampicin + ethambutol / INH } ; idea that there are resistant strains to INH + rifampicin in 2006 but not in 2007 ; idea that there are resistant strains to {ethambutol / rifampicin} in 2007 but not in 2006 ; 	<p>ACCEPT clear abbreviations to the names of the antibiotics throughout</p> <p>1 ACCEPT a description e.g. new resistances, resistant to 4 in 2006 and 5 in 2007</p> <p>3 ACCEPT idea that {resistance decreased to zero / no longer resistant}</p> <p>4 ACCEPT idea of resistance developing NB development of new resistances to {ethambutol / rifampicin} = Mp 1 and 4</p>	(3)

Question Number	Answer	Additional Guidance	Mark
5(b)(ii)	<ol style="list-style-type: none"> 1. bacteria have a mutation in {DNA / gene / eq } ; 2. idea that the {presence / usage of} {antibiotic (INH) / INH} acts as a selection pressure ; 3. idea that the allele (for resistance) is passed on ; 4. idea that bacteria {divide by asexual reproduction / divide by binary fission / produce clones / eq} ; 5. idea of increasing the allele frequency ; 6. idea that the more resistant bacteria there are, the more likely new strains will acquire the (resistance) gene ; 	<p>3 NOT gene</p> <p>4 ACCEPT divide by mitosis / conjugation / transduction / transformation / eq</p>	(3)

Question Number	Answer	Additional Guidance	Mark
5(b)(iii)	<ol style="list-style-type: none"> 1. reference to codes of {practice / conduct / eq } ; 2. idea that appropriate {antibiotics / named example} should be given to patients ; 3. idea of {educating patients about taking antibiotics / taking the full course of antibiotics ; 4. credit another appropriate procedure e.g. hand washing, screening ; 	<p>1 ACCEPT named policy /code NB Mp5 is for named practice</p> <p>2 ACCEPT not giving antibiotics if not necessary / not using antibiotics for prophylactic treatment / using narrow spectrum antibiotics / rotate antibiotics use</p>	(2)

Question Number	Answer	Additional guidance	Mark
2(a)	1. idea of suitable temperature for the bacteria to {grow / multiply / eq} ; 2. idea of preventing the growth of (human) pathogens ;	Do not accept optimum temperature	(2)

Question Number	Answer	Additional guidance	Mark
2(b)	1. idea that Petri dish 1 plate opened with bacteria already on the agar ; 2. the risk of contamination (of the investigator) / eq ;		(2)

Question Number	Answer	Additional guidance	Mark
2(c)	1. P is bacteriostatic as the bacteria in Petri dish 1 were still present but prevented from growth in Petri dish 2 / eq ; 2. Q is bactericidal as bacteria did not grow in {either Petri dish}/ eq ; 3. {antibiotic R is not effective / bacteria are resistant to R } as they grew in both Petri dishes / eq ;	Accept references to the presence or absence of clear zones as an eq for bacterial growth throughout	(3)