

Question Number	Answer	Additional Comments	Mark
1(a)	1. prevent { contamination by / entry of } bacteria / eq ; 2. idea of maintaining humid conditions ; 3. consequence of either on growth of cotton plants, e.g. competition or infection by bacteria, pathogenic bacteria, less water available for growth of plant ;	1. CCEPT microorganisms, fungi 3. CCEPT harmful to humans or plant	(2)

Question Number	Answer	Additional Comments	Mark
1(b)	1. { one parent / same plant / eq } used ; 2. no { fertilisation / gametes / meiosis } involved ; 3. reference to mitosis / asexual reproduction ;	2. CCEPT no sexual reproduction 3. CCEPT clones. IGNORE somatic and stem cells	(2)

Question Number	Answer	Additional Comments	Mark
1(c) (i)	1. as BAP increases, the percentage of explants with new shoots decreases / eq ; 2. idea of little change from 0.5 to 1.0 (mg dm^{-3}) ; 3. credit correct manipulation of the data ;	1. IGNOR descriptions of gradient. ACCEPT negative correlation 3. CCEPT 73% decrease from <u>0- 1.5</u>	(3)

Question Number	Answer	Mark
2 (a)	<ol style="list-style-type: none"> 1. positive correlation (between concentration of extract and diameter of zone of inhibition / eq ; 2. decrease small between 100 and 60% / larger decrease {between 60 and 20% / below 60%} / eq OR idea of difference in gradient before and after 60% ; 3. idea of direct proportionality {above / below} 60% e.g. linear {above / below} 60% ; 4. correct manipulation of the data (e.g. diameter decreased by 10mm as concentration of extract drops by 80% / from 100% to 20%) ; <p>allow converse statements referring to increase in concentration of extract</p> <p>Ignore reference to rate</p>	(3)

Question Number	Answer	Mark
2(b)	<ol style="list-style-type: none"> 1. 100% /full strength / eq ; 2. largest zone of inhibition / eq ; 3. means most bacteria {killed / not reproducing / prevented from growing } / fewer bacteria able to grow / eq ; 4. faster diffusion at higher concentration / eq ; 	(3)

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2 (c)	(disc) {soaked (only) in water / with no garlic extract on it / 0% garlic extract } / eq ;	(1)

Question Number	Answer	Mark
2 (d)	<ol style="list-style-type: none"> 1. so no { bacteria/ fungi / microbes } (alive) on them / prevents contamination by microbes/ eq ; 2. that could be {harmful / pathogenic / eq} ; 3. idea that could compete with {<i>Micrococcus luteus</i> / those on the plate} / affect growth of <i>Micrococcus luteus</i> / eq ; 	(2)

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2(e)	<ol style="list-style-type: none"> 1. reference to increase in zone of inhibition / reference all results would have shown an equal zone of inhibition ; 2. alcohol would have killed {the bacteria in the plate / named bacteria} / alcohol is antimicrobial / eq ; <p>OR</p> <ol style="list-style-type: none"> 1. reference to decrease in zone of inhibition; 2. extract may have been { diluted / effectiveness reduced by the alcohol / eq } ; 	(2)

Question Number	Answer	Mark
3 (a) (i)	<ol style="list-style-type: none"> 1. ref to aseptic technique (used to prevent contamination of plate), e.g. use of sterile equipment, such as a pipette ; 2. idea of uniform spreading of bacteria e.g. lawn, spread (over agar), mixed in with molten agar, seeded ; 	(2)

Question Number	Answer	Mark
3 (a) (ii)	<ol style="list-style-type: none"> 1. reduces contamination (of culture) / eq ; 2. allows { aerobic conditions / entry of air / entry of oxygen} / prevents anaerobic conditions ; 3. reduces {growth / eq} of {harmful / anaerobic} bacteria being {cultured / eq} ; 	(2)

Question Number	Answer	Mark
3 (a) (iii)	encourages growth of bacteria that are {harmful / pathogenic / eq} (to humans) ;	(1)

Question Number	Answer	Mark
3 (b)(i)	{3 species of bacteria / B1, B2 and B4 / most} {killed more effectively / had a larger zone of inhibition} (when using ethanol) / eq ;	(1)

Question Number	Answer	Mark
3 (b)(ii)	Idea of mean zone of inhibition larger when using hot water e.g. mean diameter 0.5mm larger for hot water extract ;	(1)

Question Number	Answer	Mark
3 (c) (i)	<ol style="list-style-type: none"> 1. the ranges overlap / largest diameter for cold water method is { bigger / eq } than the smallest for hot water / eq ; 2. use of calculated figures to support this e.g. hot water is 16.8 mm AND cold water is 17.0 mm OR reference to 0.2 mm overlap; 	(2)

Question Number	Answer	Mark
3 (c) (ii)	<ol style="list-style-type: none"> 1. cold water ; 2. {smaller / eq} range / spread of data is less / eq ; 	(2)

Question Number	Answer	Mark
4 (a)	<ol style="list-style-type: none"> 1. ref. to agar / eq ; 2. idea that bacteria need to be distributed ; 3. idea of {single / named} bacterial strain / eq ; 4. appropriate microbiological technique employed e.g. aseptic / sterile plates ; 	maximum (2)

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4 (b)(i)	to allow a comparison with the other discs / to show that any difference between the discs is due to the treatment given to those discs / eq ;	(1)

Question Number	Answer	Mark
4 (b)(ii)	<ol style="list-style-type: none"> 1. (tea tree oil) { diffused / eq } (out of disc) ; 2. killed the bacteria / inhibits bacterial growth / eq ; 	(2)

Question Number	Answer	Mark
4 (b)(iii)	<ol style="list-style-type: none"> 1. record several measurements / eq ; 2. divide by number of measurements (to obtain mean) ; 	(2)

Question Number	Answer	Mark
4 (c)	<ol style="list-style-type: none"> 1. 3 (or more) dilutions of tea tree oil / eq ; 2. from 50% downwards / eq ; 3. looking for minimum strength when diameter is same as original strength / eq ; 4. one other named variable kept constant ; 	<p>maximum (3)</p>

Question Number	Answer	Mark
4(d)	<ol style="list-style-type: none"> 1. 37°C is (human) body temperature ; 2. (this temp) allows growth of {pathogenic / eq} bacteria / encourages more rapid {growth /reproduction/ eq} ; 	<p>(2)</p>