

CHERRY HILL TUITION OCR BIOLOGY AS PAPER 12 MARK SCHEME

1)

(a)	(i)	<p>A mayfly (larva) B damsel fly (larva) C stonefly (larva) D caddisfly (larva) E diving beetle F bloodworm ;;</p>	2	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks All 6 correct = 2 marks 4 (or 5) correct = 1 mark</p>
(a)	(ii)	<p>(each question has) two options / AW ; each question has yes or no option / AW ;</p>	1	ACCEPT alternating
(b)		<p>1 gills ; 2 streamlined (shape) / absence of wings ; 3 flattened shape ; 4 tail(s) / hind legs , for , propulsion / swimming / moving ; 5 blood pigment for storing oxygen ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks Answers must relate to adaptations for living in an aquatic environment.</p> <p>4 IGNORE 'tail(s)' unqualified</p>
(c)	(i)	<p>nucleus ; membrane bound organelles / named organelle ; 80S / 22nm / large(r) , ribosomes ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE lack of named prokaryotic feature</p> <p>ACCEPT big(ger) ribosomes</p>
(c)	(ii)	<p>chloroplast(s) ; large / permanent , vacuole ; tonoplast ; starch (grains) ; AVP ;</p>	2	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE chlorophyll</p> <p>ACCEPT cell wall (even though not actually inside a cell)</p>

2)

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(a)	<p>1 pathogen causes disease / <u>not all</u> parasites cause disease ;</p> <p>2 (influenza) virus <u>causes</u> a disease / influenza is a disease ;</p> <p>3 parasite gains , nutrition / energy , from <u>host</u> ; or (influenza virus) does not gain , nutrients / energy , from host ;</p> <p>4 virus takes over / AW , (host cell) DNA / genetic material ;</p>	3	<p>ACCEPT damage to health / illness , as AW for 'disease'</p> <p>1 IGNORE 'parasites do not cause disease'</p> <p>2 DO NOT CREDIT 'virus is a disease' / 'influenza causes disease'</p> <p>2 ACCEPT '(swine) flu is a disease'</p> <p>Note: the influenza virus is a pathogen because it causes disease = 2 marks (mp1 and mp2)</p> <p>3 ACCEPT AW for 'gains nutrition from', e.g. 'feeds on'</p> <p>3 IGNORE 'lives off host' / 'benefits from host'</p> <p>3 ACCEPT idea of 'host' in context of suitable example</p>
(b)	(i)	2	(response) to an antigen ; involves , lymphocytes / production of antibodies ;
(b)	(ii)	5	<p>The type of RNA does not need to be specified but, if stated, AWARD only if used in the correct context.</p> <p>1 Must be a clear statement 1 ACCEPT proteins make antibodies 1 ACCEPT antibodies are polypeptides</p> <p>3 ACCEPT (m)RNA involved in transcription of DNA 3 IGNORE transcription unqualified 3 ACCEPT 'a section of DNA acts as a template for RNA' if the idea of RNA copying part of DNA is clearly present</p> <p>5 ACCEPT in context of mRNA or tRNA</p> <p>6 IGNORE 'ribosomal RNA' unqualified</p> <p>7 IGNORE translation unqualified</p>
	QWC: 2 roles of RNA ; Award if one mark is given from each of the shaded areas	1	AWARD if marking point 3 or 4 plus marking point 6 or 7 or 8 are seen
(b)	(iii)	4	<p>With the exception of L2, if name does not match description, IGNORE description and mark name</p> <p>N1 CREDIT derived term eg neutralised</p> <p>N3 IGNORE 'harm host cell' unqualified N3 ACCEPT 'prevent (host) cell becoming infected'</p> <p>A1 CREDIT derived term eg agglutinated A1 ACCEPT 'agglutination'</p> <p>A3 IGNORE 'white blood cell' A3 DO NOT CREDIT lymphocyte A3 ACCEPT neutrophils / macrophages / monocytes</p> <p>O3 IGNORE white blood cell O3 DO NOT CREDIT 'lymphocyte' O3 ACCEPT neutrophils / macrophages / monocytes</p> <p>L2 Must be in context of lysins</p>

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(c)	(i)	<p>G1 patients with , HIV⁺ / AIDS / transplant / chemotherapy ;</p> <p>E1 weak immune system / cannot produce (many) antibodies ;</p> <p>G2 pregnant women ;</p> <p>E2 foetus / embryo , has <u>undeveloped</u> immune system</p> <p style="text-align: center;">or</p> <p><u>antibodies</u> can cross <u>placenta</u> ;</p> <p>G3 health workers</p> <p style="text-align: center;">or</p> <p>people , living / working , close to outbreak ;</p> <p>E3 likely to be at (increased) risk (of disease) ;</p> <p>G4 those with (named) <u>chronic</u> diseases ;</p> <p>E4 <i>idea of inability to withstand further disease / already being in poor health ;</i></p>	4	<p>E marks can be awarded without awarding corresponding G mark unless clearly incorrect in context <i>Mark the first two groups of people mentioned max 2 marks for each group</i></p> <p>G1 ACCEPT 'patients with weak immune system' but do not also credit for E1, G1 ACCEPT 'cancer' IGNORE 'homeless people'</p> <p>G2 IGNORE babies (as close to stem)</p> <p>E2 ACCEPT 'baby as AW for embryo' E2 IGNORE weak immune system E2 ACCEPT underdeveloped immune system</p> <p>E2 IGNORE foetus gets antibodies from mother</p> <p>G3 ACCEPT suitable named professional eg nurse / doctor G3 ACCEPT 'people who have been in contact with disease' unqualified G3 IGNORE refs to overcrowding G3 IGNORE 'working with animals' unless it is clear that the animals are infected</p> <p>E3 ACCEPT ref to health workers being important in control of outbreak</p> <p>G4 eg asthma / diabetic / heart disease / TB / autoimmune disease G4 IGNORE 'lung disease' G4 IGNORE 'homeless people'</p> <p>E4 ACCEPT idea of weakened immune system for this marking point if not credited in E1 or G1</p>
(c)	(ii)	<p><i>idea of days lost at work / effect on economy ;</i></p> <p><i>idea of costing more to deal with the ill people (than the cost of vaccination) ; ora</i></p> <p><i>idea of response to public opinion ;</i> <i>idea of health service unable to cope ;</i> <i>idea of eliminating a disease ;</i></p>	1	<p>DO NOT CREDIT ref to antibiotics treating viruses</p>
(c)	(iii)	<p><i>idea of:</i> being too busy / can't be bothered / feel it is unnecessary ; lack of trust in government ;</p> <p>media scare stories ;</p> <p>concerned about side effects ; cost implication to individuals ; allergic to vaccine ; altruistic reason / other people more deserving ; fear of needles ;</p> <p>religious / cultural / ethical , reasons ;</p>	1	<p>IGNORE 'risk' unqualified throughout</p> <p>ACCEPT 'conflicting research'</p> <p>IGNORE 'not natural'</p>

3)

(a)	<p><i>idea that:</i></p> <p>1 not all , areas explored / species yet discovered ;</p> <p>2 microscopic / small / nocturnal / camouflaged , species difficult to see ;</p> <p>3 sampling might miss rare species ;</p> <p>4 organisms mistakenly identified as one species may actually be two (or more) species ;</p> <p>5 concept of species is difficult to define ;</p>	2	<p>CREDIT any valid point where seen</p> <p>1 ACCEPT 'not all species have been identified (yet)' 1 IGNORE 'yet to be named' 1 IGNORE refs to speciation 1, 2, 3 ACCEPT 'organism' as AW for species as it is an '<i>idea that</i>' marking point</p>
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(b)	(i)	<p>1 both / assessed and threatened , show increase ;</p> <p>2 number of assessed (species) , always / AW , higher (than threatened species) ; ora</p> <p>3 <i>idea of: widening gap between assessed (species) and threatened (species) / higher rate of increase for assessed species ;</i></p> <p>4 between 2000 and 2002 / in first two years , both / assessed and threatened , were level / AW ;</p> <p>5 after 2004 , both / assessed and threatened , have, reduced rate of increase / slower increase / AW ;</p> <p>6 figures to support any above statement ;</p>	<p>3 Marking points 1-5 must be stated in words, not implied by figures</p> <p>1 IGNORE both are similar shape unqualified 1 ACCEPT general statement or referring to given time period 1 ACCEPT assessed and threatened show positive correlation</p> <p>4 IGNORE 'at the start' answers must mention years</p> <p>5 IGNORE 'between 2004 and 2005' answers must imply whole of subsequent time period</p> <p>6 figures must support another point that has been credited 6 Answers must quote numbers for total assessed species and for threatened species along with two years 6 ACCEPT calculated comparisons</p>
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Table of acceptable figures:						Examples of acceptable figure quotes to support each point mp1 "between 2000 and 2009 total assessed species increase by 31000 and threatened species increase from 11500 to 17500" mp2 "in 2004 total assessed species was 38000 and threatened was 15500" mp3 "in 2000 there were 5000 more assessed species than threatened, in 2006 the gap was 23500" mp4 "between 2000 and 2002 assessed species were 16500 and threatened were 11500" mp5 "in the 4 years before 2004, total species rose by 21500 and threatened by 4000. In the 4 subsequent years total assessed rose by 13000 and threatened rose by 1500."
Year	total number of species	total species threatened	increase in total number of species since 2000	increase in number of species threatened since 2000	acceptable range for % of total	
2000	16500	11500	-	-	65 - 75	
2001	16500	11500	0	0	65 - 75	
2002	16500	11500	0	0	65 - 75	
2003	22000	12500	5500	1000	53 - 60	
2004	38000	15500	21500	4000	39 - 43	
2005	38500	15500	22000	4000	38 - 42	
2006	40000	16500	23500	5000	40 - 43	
2007	41500	16500	25000	5000	38 - 41	
2008	45000	17000	28500	5500	36 - 39	
2009	47500	17500	31000	6000	35 - 38	
2010	57500	18500	41000	7000	31 - 33	
	accept +/- 500	accept +/- 500	accept +/- 1000	accept +/- 1000		

(b)	(ii)	31 / 32 / 33 ;;	2	Correct answer = 2 marks If answer incorrect, AWARD 1 mark for 18,500 (± 500) ÷ 57,500 (± 500) or If answer not given to the nearest whole number AWARD 1 mark for any figure between 31.0 and 33.4
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(b)	(iii)	<p>1 (total species assessed is increasing because) , idea of more sampling / exploration (leads to more species identified) or b improved <u>identification</u> , techniques / described ;</p> <p>2 (threatened species is increasing because) , a loss of habitat or b climate change or c increased human population or d idea of interspecific competition from <u>introduced</u> species or e idea that some of the newly-identified species are likely to be threatened ;</p> <p>3 (there is a widening gap between total and threatened species because) , a new species tend to be discovered in areas where humans don't live so they are not threatened or b conservation techniques are working / AW ;</p>	2	<p>1 IGNORE refs to speciation as time frame too short</p> <p>1 eg DNA fingerprinting 1 IGNORE study if used in the context of species that have already been identified</p> <p>IGNORE idea of conservation not working</p> <p>IGNORE refs to hunting</p> <p>IGNORE 'competition from newly discovered species' as this implies that the candidate thinks the species was not present until it was discovered</p> <p>e.g 'as more species are discovered, the number of threatened species will go up'</p>
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(c)		range / number , of habitats / ecosystems ; genetic variation (within species) ;	1	CREDIT only these answers
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4)

(a)		idea that (dairy) animals use plants for food ; plants are the basis of all food chains ; (some) yoghurts contain , (named) fruit / plant (flavouring) ;	1	e.g. cows eat grass / cows are herbivores IGNORE refs to microorganisms
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<p><i>advantages</i></p> <p>A1 low in , saturated fat / cholesterol ; ora</p> <p>A2 less likely to cause , heart disease / atherosclerosis / AW ;</p> <p>A3 no / fewer , animal welfare / moral / ethical / religious, issues ;</p> <p>A4 source of <u>essential amino acids</u> ;</p> <p>A5 high rate of (protein) production ;</p> <p>A6 <i>idea of</i> fewer energy losses / more energy efficient ;</p> <p>A7 <i>idea that</i> production can be changed more easily (according to demand) ;</p> <p>A8 <i>idea that</i> cheaper to <u>produce</u> (once established) ;</p> <p>A9 uses less , land area / space ;</p> <p>A10 (might be) <u>grown</u> on (plant) waste ;</p> <p>A11 less risk of transfer of disease from animals ;</p> <p>A12 can be produced in any , climate / season ;</p>	<p>IGNORE refs to obesity / weight loss ACCEPT ref to protein produced by bacteria</p> <p>A1 ACCEPT 'no , cholesterol / saturated fat' A1 ACCEPT implication that fat is saturated , e.g. ,fat that leads to high blood cholesterol A1 IGNORE 'animal fat' unqualified</p> <p>A3 ACCEPT 'suitable for , vegetarians / vegans' A3 ACCEPT refs to fewer animals being slaughtered</p> <p>A5 IGNORE 'high yield' answers must imply rate</p> <p>A6 IGNORE 'efficient' unqualified A6 ACCEPT 'more efficient because lower down food chain'</p> <p>A7 Answers could be in context of rate or content</p> <p>A8 IGNORE 'uses fewer resources'</p> <p>A9 IGNORE 'uses fewer resources'</p> <p>A10 needs to be stated as an advantage</p> <p>A11 e.g. CJD, salmonella from eggs</p>
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<p>(b)</p> <p><i>disadvantages</i></p> <p>D1 different , taste / texture / palatability ;</p> <p>D2 lacks / less , iron ;</p> <p>D3 needs to be processed (to add , taste / texture) ;</p> <p>D4 <i>idea of</i> consumer resistance ;</p> <p>D5 growth conditions suit , pathogenic / harmful / spoilage , microorganisms / bacteria / microbes ;</p> <p>D6 need for , isolation / purification (of protein from material on which they grow) ;</p> <p>D7 may require removal of , toxins / (excess) RNA ;</p> <p>D8 loss of farming jobs ;</p> <p>D9 <i>idea of</i> higher set up costs ;</p>	<p>7</p>	<p>D4 ACCEPT e.g. 'people don't want to eat something made from fungus' D4 'people prefer flavour of meat' = 2 marks (D1 and D4)</p> <p>D5 ACCEPT 'food might be contaminated with bacteria etc' D5 IGNORE mould / bad bacteria</p> <p>D6 ACCEPT 'purification of food from waste'</p> <p>D9 IGNORE 'expensive' unqualified D9 ACCEPT 'equipment costs a lot'</p>
<p>QWC - balanced account</p>	<p>1</p>	<p>Award if 2 A marks and 2 D marks have been awarded</p>

<p>(c)</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 20%;"><i>method</i></th> <th style="width: 80%;"><i>description</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><i>freezing</i></td> <td>1 slows / reduces / AW , <u>enzyme</u> , activity / AW ; 2 removes available water / AW ; <i>max 1</i></td> </tr> <tr> <td style="text-align: center;"><i>pickling</i></td> <td>(low pH) denatures , enzymes / proteins ;</td> </tr> <tr> <td style="text-align: center;"><i>irradiation</i></td> <td>(microbial) DNA / genes / genetic material , destroyed / damaged / changed / mutated / disrupted ;</td> </tr> </tbody> </table>	<i>method</i>	<i>description</i>	<i>freezing</i>	1 slows / reduces / AW , <u>enzyme</u> , activity / AW ; 2 removes available water / AW ; <i>max 1</i>	<i>pickling</i>	(low pH) denatures , enzymes / proteins ;	<i>irradiation</i>	(microbial) DNA / genes / genetic material , destroyed / damaged / changed / mutated / disrupted ;	<p>3</p>	<p><i>Award one mark per box</i></p> <p>1 ACCEPT 'too cold for enzymes to work effectively' 1 DO NOT CREDIT refs to enzymes becoming denatured 1 IGNORE 'stops / disrupts (enzyme activity)'</p> <p>2 ACCEPT 'ice crystals puncture cell membrane'</p> <p>DO NOT CREDIT high pH ACCEPT correct description of denaturation, e.g. 'shape of active site changed' IGNORE refs to osmosis</p> <p>IGNORE 'mutation' without ref to genetic material</p>
<i>method</i>	<i>description</i>									
<i>freezing</i>	1 slows / reduces / AW , <u>enzyme</u> , activity / AW ; 2 removes available water / AW ; <i>max 1</i>									
<i>pickling</i>	(low pH) denatures , enzymes / proteins ;									
<i>irradiation</i>	(microbial) DNA / genes / genetic material , destroyed / damaged / changed / mutated / disrupted ;									

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5)

		6	
Biological Term	Description		
Natural Selection	The theory proposed by Darwin on the evolution of species		
Speciation	The <u>formation</u> of a new species ;		IGNORE 'founding a new species' IGNORE refs to classification / naming ACCEPT descriptions of mechanism of speciation
<u>Continuous variation</u> ;	Differences between individuals that cover a range of values rather than discrete categories		
Adaptation	a variation that increases the chances of survival ;		ACCEPT 'something that helps survival'
<u>Binomial</u> ;	A system of naming organisms that uses two scientific (Latin) names for species		
<u>ex situ</u> ;	The type of conservation of which seed banks are an example		
Environmental Impact Assessment / EIA ;	A study carried out by a local planning authority in order to judge the effect of a development on the biodiversity of an area.		DO NOT CREDIT 'EIA' if wrong words given IGNORE 'environmental impact survey'
Total		6	

6)

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(a)	(i)	0.6 : 1 ; ;		<p>Correct answer = 2 marks Ratio must be correct way round 1: 0.6 is not correct but can still allow mark for correct working if shown</p> <p>If answer incorrect ALLOW 1 mark for working e.g. 600 ÷ 1000</p> <p>600 : 1000 = 1 mark</p>
			2	
	(ii)	<p>as SA:VOL ratio decreases rate of diffusion decreases OR as SA:VOL ratio increases rate of diffusion increases ;</p> <p>use of two pairs of figures with correct units (mms⁻¹) for rate to illustrate trend ;</p> <p>ref to rate of diffusion in either of the first two cubes not fitting trend ;</p>	max 2	<p>ACCEPT <u>positive</u> correlation DO NOT CREDIT as rate of <i>diffusion</i> decreases SA:VOL ratio decreases</p> <p>use of figs requires ratio quote and rate quote at two points e.g. at SA:VOL of 3:1 rate is 0.02 mms⁻¹, at SA:VOL ratio of 0.2:1 rate is 0.013 (correct units only need to be used once) DO NOT CREDIT if unit for SA:Vol given</p> <p>ACCEPT correct calculation of rate change e.g. when the SA:VOL ratio was 3:1 the rate of diffusion was 0.020mms⁻¹ which is 0.007mms⁻¹ faster than the cube with 0.2:1 SA:VOL ratio</p>
	(iii)	<p>(large plants) have a, small / low, SA : VOL ratio ;</p> <p><i>idea of diffusion too slow (to supply requirements) ;</i></p> <p><i>idea of need transport system (for water / minerals / assimilates) ;</i></p> <p><i>idea of need (special) surface area for, gaseous exchange / uptake of minerals ;</i></p>	max 2	<p>DO NOT CREDIT smaller unless we know smaller than what ACCEPT e.g. larger plants have a smaller SA : Vol ratio</p> <p>must have idea of <i>too slow</i> ACCEPT diffusion takes <i>too long</i> DO NOT CREDIT transport of gases</p>
(b)	(i)	divided length of side by time taken ;	1	IGNORE divide mm by s (units alone too vague)
	(ii)	<i>idea that student used whole length of side, rather than half length ;</i>	1	ACCEPT needs to divide answer by 2 / distance has to be to centre of cube rather than whole length of side / assumed diffusion occurs (across whole cube) from one side
(c)		<p><i>squamous epithelium</i> short(er) diffusion, distance / path ;</p> <p><i>large number of alveoli</i> large(r) surface area ;</p> <p><i>good blood supply</i> high / large / steep, concentration gradient OR removes oxygen (from lung surface) / brings carbon dioxide (to lung surface);</p> <p><i>good ventilation</i> high / large / steep, concentration gradient OR supplies oxygen (to alveoli) / removes carbon dioxide (from alveoli) ;</p>	4	<p>ACCEPT reduced / shorter diffusion distance ACCEPT thin diffusion barrier IGNORE thin diffusion pathway</p> <p>ACCEPT increases surface area IGNORE SA : Vol ratio</p> <p>ACCEPT maintains / creates concentration gradient IGNORE ref diffusion gradient</p> <p>ACCEPT maintains / creates concentration gradient IGNORE ref diffusion gradient IGNORE ref to air</p>
Total			12	

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7)

(a)	(i)	<p>1 placenta has low pO_2 ;</p> <p>2 adult (oxy)haemoglobin will, release O_2 / dissociate, (in, low pO_2 / placenta) ;</p> <p>3 fetal haemoglobin has higher affinity for oxygen / described ;</p> <p>4 fetal haemoglobin, is (still) able to take up (some) oxygen, in placenta / at low(er) pO_2 ;</p>	<p>ACCEPT oxygen tension for pO_2 throughout IGNORE lower</p> <p>This must be a comparative statement CREDIT <i>idea that</i> fetal haemoglobin picks up more oxygen than the adult haemoglobin at a given pO_2 / fetal haemoglobin picks up oxygen at lower pO_2 IGNORE ref to easier / quicker, uptake of O_2</p> <p>This is not a comparative point, the emphasis is on the ability of fetal haemoglobin to take up some oxygen even when little is available DO NOT CREDIT if response suggests that % saturation increases as pO_2 decreases ACCEPT fetal oxyhaemoglobin</p>
	(ii)	<p>(fetal) haemoglobin may not crystallise (much) (at low pO_2) ;</p> <p>red blood cells do not change shape ;</p> <p>(fetal) haemoglobin can pick up more oxygen at low pO_2 (than sickle haemoglobin);</p> <p><i>idea that</i> more oxygen, transported / delivered (around body) ;</p>	<p>max 3</p> <p>assume candidate refers to fetal haemoglobin unless adult / maternal stated</p> <p>Emphasis for this mp is the fetal haemoglobin being able to pick up more oxygen than sickle haemoglobin CREDIT (fetal) haemoglobin becomes more saturated at low pO_2 (than sickle haemoglobin) Allow ref to lower pO_2 unless it is implied that fetal haemoglobin picks up more oxygen at lower pO_2 than higher pO_2</p> <p>Emphasis for this mp is the distribution of oxygen IGNORE more oxygen obtained by person (as this implies breathing)</p> <p>max 2</p>
(b)		<p>diffusion ;</p> <p>from high concentration to low concentration / down concentration gradient;</p> <p>(hydrostatic) pressure in capillary high(er than in tissue fluid) ;</p> <p>capillary (walls) leaky / described ;</p> <p>fluid / plasma, forced out (of capillary) OR fluid / plasma, moves, from higher pressure to lower pressure / down pressure gradient ;</p> <p>(as the fluid / plasma moves out) glucose / oxygen / small molecules, leave with, fluid / plasma ;</p> <p>QWC;</p>	<p>IGNORE diffusion of glucose throughout answer</p> <p>'down diffusion gradient' = 1 for 'diffusion' (mp 1 not mp 2) DO NOT CREDIT diffusion linked to pressure</p> <p>ACCEPT pO_2 for concentration</p> <p>ACCEPT permeable IGNORE pores / fenestrations / holes ACCEPT <i>idea of</i> small gaps between cells</p> <p>Emphasis here is on pressure forcing fluid out DO NOT CREDIT tissue fluid forced out</p> <p>Emphasis here is on glucose/ oxygen being carried out as a result of mass flow of fluid (not diffusion)</p> <p>max 3</p> <p>award if any two terms spelt correctly and used in correct context from: diffusion / diffuse, pressure, hydrostatic, concentration gradient</p> <p>1</p>