

1)			
(a)(i)	(Aerobic) respiration;	1	Accept ATP production/energy release Reject <u>anaerobic</u> respiration Reject energy production
(a)(ii)	Golgi (apparatus/body);	1	Ignore smooth ER
(b)	(‘It’ = Optical microscope) 1. Has low resolution/not high enough resolution; 2. (Because) wavelength of light not short enough/too long;	2	Ignore reference to magnification Accept converse relating to EM Accept larger wavelength Accept statements that microscopes have a wavelength
2)			
(a)(i)	Glucose <u>and</u> fructose;	1	Ignore reference to alpha and beta Either way around
(a)(ii)	Glucose <u>and</u> galactose;	1	Ignore reference to alpha and beta Either way around
(b)	1. (Amylase) pancreas, produces maltose; 2. (Maltase) in/on epithelium (of small intestine), produces glucose;	2	Place <u>and</u> product = 1 mark (mark horizontally) Ignore references to salivary glands or saliva Accept wall/lining of small intestine Ignore reference to cells alone Ignore reference to ribosomes/rER
3)			
(a)	1. Water lost into gut/water moves into gut/ water leaves cells; 2. Low(er) water potential of intestine/gut (lumen); 3. Osmosis/movement down a WP gradient; 4. Less/not enough water (re)absorbed;	3 max	QWC ignore large/small WP QWC ignore reference to high/low concentrations of water or high/low concentrations of solution Ignore reference to stomach QWC ignore ‘along’ concentration gradients

.(b)(i)	Starch is not (very) soluble/does not dissolve well;	1	Accept converse for glucose A Ignore 'starch is osmotically inactive' Ignore reference to solute potentials
(b)(ii)	55;; Working : 5% for A and 60% for B ;	2	2 marks for correct answer Max 1 if answer as a %
4)			
(a)	1. (Phosphate) changes shape of TK/changes shape of enzyme/changes the active site; 2. Active site forms/becomes the right shape/can bind to substrate/complementary to substrate/E-S complex can form;	2	It = phosphate Accept 'alters' for changes 1. Reject that phosphate is an inhibitor Accept adding energy/affecting charged/affects polar groups (on amino acids) 2. Reject similar/same shape as substrate
(b)	1. Faulty TK has functional active site <u>without phosphate</u> ; 2. (So, faulty) TK functional all the time/TK not controlled (by phosphate);	2	Accept 'works without phosphate'
.(c)	1. Non-competitive inhibitor/binds to site other than active site; 2. Causes TK to be in non-functional form/active site not formed/wrong shape/E-S complex not formed; 3. So, (uncontrolled) cell division stopped/slowed/controlled;	2 max	Accept allosteric site Do not accept 'changes shape' unqualified

5)

(a)	<ol style="list-style-type: none"> 1. Infected by/susceptible to (other) pathogen(s)/named disease caused by a pathogen (from environment); 2. Pathogen(s) reproduce/cause disease (in host); 3. Damage cells/tissues/organs; 4. Release toxins; 	3 max	<p>Context is where immune system cannot prevent or stop these events</p> <p>Allow attack/kill</p> <p>MPs not given in context of HIV</p>
b)(i)	<ol style="list-style-type: none"> 1. (HIV enters cells) before antibodies can bind to/destroy it; 2. Antibodies cannot enter cells (to destroy HIV)/stay in blood; <p>OR</p> <ol style="list-style-type: none"> 3. (Enters cells) before (secondary) immune response caused/before memory cells have time to respond; 4. So no antibodies present (to attack HIV); <p>OR</p> <ol style="list-style-type: none"> 5. Vaccine taken up too quickly to cause immune response; 6. So no antibodies/memory cells formed; 	2 max	<p>Ignore SAFETY comments</p> <p>1. and 2. Relate to antibodies</p> <p>3. and 4. Relate to virus</p> <p>5. and 6. Relate to vaccine</p>
(b)(ii)	<ol style="list-style-type: none"> 1. Antigen (on HIV) changes; 2. (Specific) antibody/receptor no longer binds to (new) antigen; <p>OR</p> <ol style="list-style-type: none"> 3. Many different strains of HIV/many antigens present on HIV; 4. Not possible to make a vaccine for all antigens/vaccine may not stimulate an antibody for a particular antigen; 	2 max	<p>Accept mutates</p> <p>Ignore SAFETY comments</p>

(c)	<p>3 suitable suggestions;;;</p> <p>E.g.</p> <ol style="list-style-type: none"> 1. Inactive virus may become active/viral transformation; 2. Attenuated virus might become harmful; 3. Non-pathogenic virus may mutate and harm cells; 4. Genetic information/protein (from HIV) may harm cells; 5. People (may) become/test HIV positive after vaccine used; 6. This may affect their work/life; 	3 max	<p>QWC ignore reference to HIV cells</p> <ol style="list-style-type: none"> 5. Vaccinated people may develop disease from a different strain to that in the vaccine 6. May continue high risk activities and develop or pass on HIV
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6)

<p><u>By osmosis (no mark)</u></p> <ol style="list-style-type: none"> 1. From a high water potential to a low water potential/down a water potential gradient; 2. Through aquaporins/water channels; <p><u>By facilitated diffusion (no mark)</u></p> <ol style="list-style-type: none"> 3. Channel/carrier protein; 4. Down concentration gradient; <p><u>By active transport (no mark)</u></p> <ol style="list-style-type: none"> 5. Carrier protein/protein pumps; 6. Against concentration gradient; 7. Using ATP/energy (from respiration); <p><u>By phagocytosis/endocytosis (no mark)</u></p> <ol style="list-style-type: none"> 8. Engulfing by cell surface membrane to form vesicle/vacuole; <p><u>By exocytosis/role of Golgi vesicles (no mark)</u></p> <ol style="list-style-type: none"> 9. Fusion of vesicle with cell surface membrane; 	5 max	<p>No mark awarded for naming terms e.g. osmosis, facilitated diffusion, active transport, co-transport etc.</p> <p>QWC ignore large/small WP</p> <p>QWC ignore reference to high/low concentrations of water or high/low concentration of solution</p> <p>QWC ignore 'along' concentration gradients</p> <p>Co-transport subsumed into mark scheme for active transport and facilitated diffusion</p> <p>Can award MP2, 3, 5 for 3 marks with no context given</p> <p>Ignore lipid <u>diffusion</u> as in stem of question</p>
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7)

(a)	Statement	Starch	Cellulose	Glycogen	3	One mark for each correct row
	Found in plant cells	✓	✓			
	Contains glycosidic bonds	✓	✓	✓		
	Contains β-glucose		✓			
(b)	Hydrolysis;			1	Accept: if phonetically correct Do not accept: 'hydration'	
(c)	<ol style="list-style-type: none"> 1. Coiled / helical / spiral; 2. (So) compact / tightly packed / can fit (lots) into a small space; 3. Insoluble; 4. (So) no osmotic effect / does not leave cell / does not affect <u>water potential</u>; 5. Large molecule / long chain; 6. (So) does not leave cell / contains large number of glucose units; 7. Branched chains; 8. (So) easy to remove glucose; 			2 max	Feature = one mark Explanation = one mark Note: these are independent marking points These must be related for <u>both</u> marks but can be in reverse order 4. Accept: prevents osmosis 4. and 6. Accept: can't cross membranes	
(d)	Two marks for correct answer of 479-521;; One mark for incorrect answers in which candidate clearly divides measured length by actual length;			2	Accept: measured and actual lengths in different but correct units for 1 mark The actual range is 23-25 mm, If they just divide this by 48 they gain 1 mark Just writing the formula is insufficient, numbers must be used	

8)

i(a)	<ol style="list-style-type: none"> 1. Cell wall not formed / production inhibited; 2. Lower <u>water potential</u> in bacterium; 3. <u>Water enters</u> and causes lysis/expansion/pressure; 	2 max	<ol style="list-style-type: none"> 1. Q Accept: weakened cell wall, but do not accept 'cell wall is broken down' 2. Accept: converse 2. Must be clear that the lower water potential is in the bacterium
i(b)	Human cells lack enzyme (B)/have a different enzyme/produce different fatty acids/use different substrates;	1	Neutral: 'human cells do not have cell walls' as out of context

9)

b)(a)	<ol style="list-style-type: none"> 1. Strands separate / H-bonds break; 2. DNA helicase (involved); 3. Both strands/each strand act(s) as (a) template(s); 4. (Free) nucleotides attach; 5. Complementary/specific base pairing / AT <u>and</u> GC; 6. DNA polymerase joins nucleotides (on new strand); 7. H-bonds reform; 8. Semi-conservative replication / new DNA molecules contain one old strand and one new strand; 	6 max	<ol style="list-style-type: none"> 1. Q Neutral: strands split 1. Accept: strands unzip 4. Neutral: bases attach 4. Accept: nucleotides attracted 6. Reject: if wrong function of DNA polymerase 8. Reject: if wrong context e.g. new DNA molecules contain half of each original strand
b)(i)	18;	1	Do not accept 17.5
c)(ii)	10;	1	
c)(iii)	<ol style="list-style-type: none"> 1. Horizontal until 18 minutes; 2. (Then) decreases as straight line to 0 μm at 28 minutes; 	2	<ol style="list-style-type: none"> Allow +/- one small box 2. Allow lines that start from the wrong place, ending at 0 at 28 minutes
c)(i)	<p>Two marks for correct answer of 19.68 or 19.7;;</p> <p>One mark for incorrect answers in which candidate clearly multiplies by 0.82;</p>	2	<p>Accept 19hrs 41mins</p> <p>Allow one mark for incorrect answers that clearly show 82% of 24 (hours)</p>
c)(ii)	<ol style="list-style-type: none"> 1. No visible chromosomes/chromatids; 2. Visible nucleus; 	1 max	
c)(iii)	<p>D (no mark)</p> <ol style="list-style-type: none"> 1. <u>Lower</u> % (of cells) in interphase / <u>higher</u> % (of cells) in mitosis/named stage of mitosis; 2. (So) more cells dividing / cells are dividing quicker; 	2	<ol style="list-style-type: none"> 1. Accept: 'less' or 'more' instead of '%' 1. Do not accept: higher % (of cells) in each/all stage(s) 2. Accept: uncontrolled cell division 2. Do not award if Tissue C is chosen