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- 1 (a) (i) chloroplasts ; **R** chlorophyll  
cellulose cell wall ; **A** 'not made of, murein / peptidoglycan'  
(sap / large / permanent) vacuole(s) ; **A** tonoplast  
nucleus / nuclear membrane / nuclear envelope ; **R** DNA / RNA  
nucleolus ;  
mitochondria ;  
endoplasmic reticulum / Golgi ;  
amyloplasts ; **A** starch, grains / granules  
more than one chromosome / linear chromosome(s) ; [4]
- (ii) membrane ;  
cytoplasm ;  
ribosomes ;  
chromosomes ; **A** 'strands of DNA' **R** DNA unqualified  
glycogen granules ;  
oil droplets ; [max 2]
- (b) cheese ; tofu ;  
yoghurt ; soya sauce ;  
sour milk ; sauerkraut ;  
bread ; vinegar ;  
alcohol / any named alcoholic drink ; tapai ;  
Quorn / mycoprotein ; tempe / tempeh ;  
single cell protein ; kimchee ; [max 2]
- (c) *reject bacteria becoming immune and antibiotics causing mutation*
- 1 mutation / mutant ;  
2 stronger wall / less permeable wall / enzyme to breakdown antibiotic / AW ;  
3 antibiotic kills bacteria except those that are , mutant / resistant ;  
4 antibiotic is, selective agent / AW ; **A** ref to (natural) selection  
5 (resistant) bacteria reproduce ; *ignore mitosis* [max 3]
- (d) *this may be answered with reference to insulin*
- 1 fast reproduction rate / AW ;  
2 identical offspring / cloning ;  
3 small number of genes ;  
4 single cells ;  
5 copy / use, genes from, other organisms / viruses ;  
6 makes, protein / named protein, from another organism ;  
7 have plasmids ;  
8 used to transfer gene(s) into bacteria / easy to put gene(s) in bacteria ;  
**A** DNA for gene  
**R** product / protein, taken from, human / other organism [max 2]
- [Total: 13]**

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- 2 (a) temperature / heat / cold ;  
pressure ;  
pain / sharpness ;  
texture / touch ; [max 2]
- (b) ganglion ;  
grey matter (of spinal cord) ; [2]
- (c) (i) electrical ;  
A electrochemical / movement of ions / electric current  
R electrons / electricity [1]
- (ii) myelin / (fatty) sheath ; [1]
- (iii) *award two marks if correct answer with units is given  
if not, award one mark if*  
  - *correct answer with no units*
  - *incorrect answer with correct units*
  - *no answer but correct working*
  - *incorrect answer but correct working*  
1.5 / 0.02 ;  
75, metres per second or m/s or  $\text{m s}^{-1}$  or  $\text{m sec}^{-1}$  ; [2]
- (iv) synapse(s) / gap(s) (between neurones) ; [1]
- (d) (i) (V / biceps) contracts ;  
arm / elbow, flexes / bends / pulls away from stimulus / AW ; [2]
- (ii) *allow ecf from (i)  
if muscle not identified assume it is V*  
triceps (muscle) / (muscle) W / antagonistic muscle / opposing muscle, contracts ;  
muscle V relaxes / passive stretching of V ;  
A ref to W as antagonistic if already said it contracts  
R 'V relaxes that causes contraction of W' [2]

[Total: 13]

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- 3 (a) removal of waste (products) of, metabolism / chemical reactions ;  
**A** 'made within cells' as alternative to metabolism  
harmful / toxic / poisonous / AW ;  
substance(s) in excess of requirements ; [3]
- (b) (i) *accept statements from the question instead of letter*  
*accept letter written on the structure (no label line) or nearby if clear*  
*reject if letter used on two or more areas and one is incorrect*
- F** on cortex / white area between fibrous capsule and stippled medulla ; *allow on glomerulus but not anywhere else on tubule*  
**R** on renal artery *including after it divides* ;  
**U** on ureter ; [3]
- (ii) ref to blood pressure ;  
due to the heart / AW ;  
ref to capillaries ; **A** glomerulus  
small molecules forced out (of blood) ;  
two examples ;  
urea, water, amino acids, glucose / sugar, salts / ions / minerals, uric acid, ammonia,  
any named hormone / spent hormone
- A** any two named, ions / hormones as the two examples [max 3]
- (iii) *glucose mark only the first two answers if more than two given*
- diffusion ;  
active uptake / active transport ;  
**A** selective , reabsorption / uptake ; [max 2]
- water mark only the first answer if more than one given*
- osmosis ; **A** diffusion [3]

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- 4 (a) (where sperm are stored before ejaculation) **E** ;  
 (is cut or tied during a vasectomy) **B** ;  
 (produces fluid for sperm to swim in) **C** ;  
 (where meiosis occurs) **F** ; [4]

- (b) (i) urethra ; [1]

- (ii) reduction in flow of urine / difficult to urinate ;  
 difficult to empty bladder ;  
 pain (when urinating) ;  
 needing to urinate more often ;  
 dribbling / spraying, of urine ;  
 increased risk of infections of, bladder / kidney / prostate / urethra ;  
 difficult to ejaculate ; **A** difficulty in release of, sperm / semen [max 2]

- (c) *many examples that candidates may give*

named structure ;  
 how diameter is reduced ;  
 purpose ; [3]

- (d) fertility drugs

FSH / LH / clomiphene / clomid ; **R** oestrogen  
 causes the ovaries to produce more eggs / AW ;  
 increases chance of fertilisation ;  
 ref to in vitro fertilisation ;  
*female* hCG ;  
 stimulates follicles to release eggs ;  
 progesterone ;  
 causes, lining of uterus / endometrium, to thicken ; **A** maintains lining  
 increases chance of implantation ;  
*male* hCG ;  
 to stimulate testosterone production ;  
 FSH / LH / testosterone ;  
 stimulates sperm production ; max 3

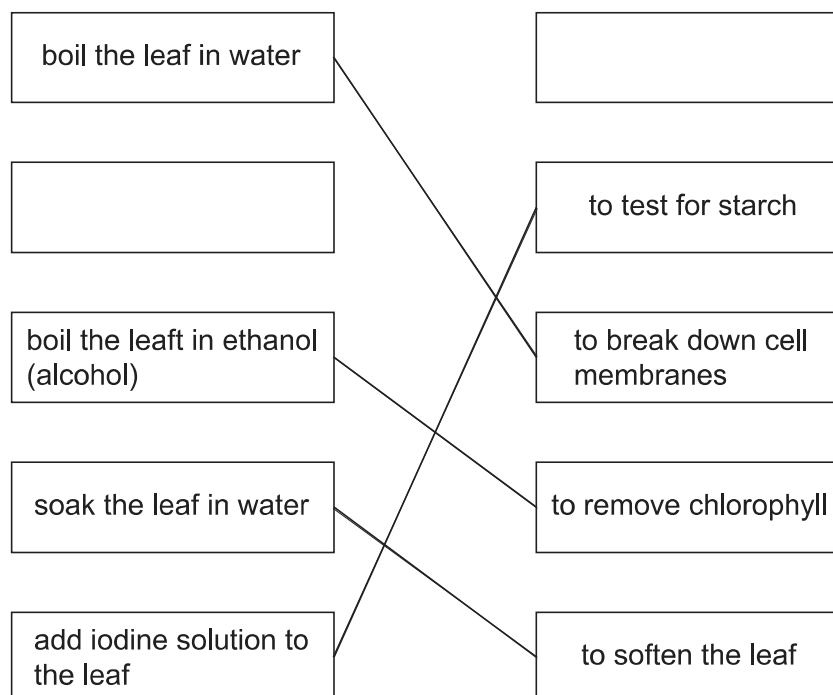
*chemical methods of birth control*

oestrogen / progesterone ;  
 (contraceptive) pill / patch / injection / implant ; **R** tablet / medicine  
 prevents FSH release / AW ;  
 prevents, egg / follicle, development ;  
 prevents, ovulation / release of eggs ; **A** no egg to be fertilised  
 (progesterone only pills)  
 inhibit sperm movement through cervix / plug of mucus at cervix ;  
 prevents implantation ;  
 kills sperm in, vagina / cervix ;  
 prevents sperm, reaching egg / entering oviduct ; max 3

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5 (a) (i)



[4]

(ii) chlorophyll masks the colour change (shown with iodine) / AW ;

[1]

(b) light ;  
water ; **A** moisture  
suitable temperature ; **R** heat  
chlorophyll ;

[max 2]

(c) to show that the factor under test is responsible for the change observed / AW ;  
e.g. to show carbon dioxide is needed  
to show plants can photosynthesis under the glass cover  
**A** so there is only one variable

[1]

(d) to be sure that starch is produced during the experiment ;

[1]

(e) *correct result for starch test and reason needed for each mark*  
*reject crossed ticks*

stage	leaf from plant	starch test (✓ or ×)	reason
2	A and B	×	plants have had no light for photosynthesis / destarched / AW ;
4	A	×	plant has had no carbon dioxide for <u>photosynthesis</u> ;
	B	✓	plant has had, carbon dioxide / all conditions, for <u>photosynthesis</u> ;

[3]

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- (f) no photosynthesis ;  
 plant respire ; **R** 'plant begins to respire' / 'instead it respire'  
 carbon dioxide produced ; **A** correct equation for aerobic respiration  
 carbon dioxide, released / diffuses, from plant ;

[max 3]

**[Total: 15]**

- 6 (a) community / (all) organisms / animals and plants / (all) species / (all) populations / AW ;  
 (living together) in same, area / place / environment ; **R** habitat  
 many habitats ;  
 interacting / interdependent / AW ; **A** food chains / food web  
 (together with) abiotic / physical / non-living, factors / features ;

[max 2]

- (b) they provide excellent food for humans ;  
 they provide, sport / fishing, for tourists ;

[2]

- (c) (producer) algae ;  
 (herbivore) cichlid fish + prawns ;  
 (carnivore) Nile perch + humans ;

[3]

- (d) 1 algae grow / plants grow ; **A** algal bloom  
 2 less light for, plants / photosynthesis ; **A** more competition for light  
 3 (therefore) plants die ;  
 4 plants stop producing oxygen ;  
 5 (aerobic) bacteria / decomposers, feed on dead plants ;  
 6 use up oxygen (in respiration) / ref to aerobic ;  
 7 low levels of oxygen cause fish to, die / suffocate ; **A** not enough oxygen to breathe /  
 AW  
 8 bacteria produce toxins which cause fish to die ;

[max 4]

**[Total: 11]**