Mark Scheme

5158/01 (40 marks)

1	А	2	В	3	В	4	В	5	А
6	С	7	С	8	С	9	А	10	С
11	D	12	С	13	А	14	С	15	В
16	С	17	D	18	С	19	В	20	D
21	С	22	С	23	В	24	С	25	А
26	D	27	В	28	А	29	В	30	С
31	D	32	D	33	D	34	А	35	А
36	D	37	С	38	D	39	В	40	А

<u>5158/02</u>

Section A (50 marks)

ood into small(er) pieces [1] mical change [1] uscles [1] digestive juice) [1] rface area [1] action [1]	R: molecules A: without enzymes A: mastication / chewing / churning
<u>nemical</u> digestion [1] allow [1]	
relation / as (relative) body mass nore figures from the graph (uni	s increases + time in digestive system its must be quoted at least once) [1] (e.g. either outlier quoted) [1]
1	nore figures from the graph (un v/some + are outliers/anomalies s) from the graph [1]

mp 7 only information about 26 species of mammal / small sample size [1] mp 8 idea about unknown validity [1] mp 3-8 [max 3]

mp 1-2 + mp 3-8 [max 4]

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function	letter on Figure 1.1	name	
structure that separates oxygenated and deoxygenated blood	F	septum	[1]
		bicuspid/mitral/atrioventricular	
structure that prevents backflow of blood from ventricle to atrium	D	+ <u>valve</u> A: "AV valve"	[1]
		R: right atrioventricular valve	
blood vessel that carries	В	pulmonary artery	 [1]
deoxygenated blood	Н	vena cava	
chamber of the heart that contains	J	right atrium	Г Г11
deoxygenated blood	G	right ventricle	

2 (b) (i) mp 1 pulse rate increases and remains constant [1]

mp 2 immediate/sudden/steep/rapid/AW + increase in pulse rate [1] R: exponential mp 3 increases from 44–48 <u>bpm</u> to 164–170 <u>bpm</u> / increases by 120–126 <u>bpm</u> / by 3.5 to 4 times or approx 4 [1] mp 4 maximum / 164–170 <u>bpm</u> + at 4 <u>min(utes)</u> / 2 <u>min(utes)</u> after race starts [1]

R: no units used

[max 3]

- 2 (b) (ii) mp 1 adrenaline stimulates increase in + heart/pulse <u>rate</u> [1]
 - mp 2 increase in blood + carbon dioxide (concentration) / acidity + detected [1] A: decrease in pH
 - mp 3 nerves stimulate heart to beat faster [1]
 - mp 4 ref to muscle contraction / AW [1]
 - mp 5 muscles require more energy / muscles are doing more work [1]
 - mp 6 (rate of aerobic) respiration increases [1] R: 'produce' energy
 - mp 7 increase demand for + oxygen / glucose [1]
 - mp 8 ref to removal of + carbon dioxide / lactic acid / heat [1]
 - mp 9 more + blood / carbon dioxide + to <u>lungs</u> (per unit time) [1]
 - mp 10 more + blood / oxygen / glucose + to muscles [1]
 - mp 11 AVP (e.g. ref to ATP / vasodilation in muscles) [1]
 - [max 4]
- 3 (a) gene a length of DNA that codes for a protein [1]
 R: chromosome / molecule of / genome
 gene mutation a change in base sequence of DNA [1]
- 3 (b) (i) 1 Bb [1] 2 - bb [1] 3 - Bb [1]
- **3 (b) (ii)** phenotype of parents: unaffected (by acatalasia) x affected (by acatalasia) [1]

	genotype of parents: gametes: genotype of offspring: phenotype of offspring: R: "F1/F2 generation" [max 4]	A: normal/carrier (in place of "unaffected") R: father/mother/male/female/sick Bb x bb [1] B, b, b, b [1] R: lines are not drawn / not correctly aligned Bb, Bb, bb, bb [1] unaffected, unaffected, affected [1]			
3 (b) (iii)	test (cross) [1]				
4 (a)	carbon dioxide [1] urea [1]				
4 (b)	0 / 0.0 (g dm ⁻³) [1] proteins too big, to pass the blood) / out of the glo	$0.0 \text{ (g dm}^{-3}) [1]$ teins too big, to pass through the capillary wall (in glomerulus) / to be filtered (from blood) / out of the glomerulus [1]			
4 (c)	mp 1 blood flows into the (dialysis) machine / blood is returned to the patient [1] mp 2 blood passes over a dialysis membrane / countercurrent flow described [1] mp 3 the dialysis membrane separates the person's blood and the dialysis fluid [1] mp 4 dialysis fluid contains + glucose / salts / no urea [1] mp 5 movement (across membrane) by diffusion / down a concentration gradient [1] mp 6 urea leaves the blood / enters the dialysis fluid [1] mp 7 dialysis fluid is refreshed [1] mp 8 excess/some salt + leaves the blood / enters the dialysis fluid [1] mp 9 excess/some water + leaves the blood / enters the dialysis fluid [1] mp 10 glucose/salts in dialysis fluid same concentration as (should be) in blood [1] mp 11 no net loss of glucose [1] [max 5]				
4 (d)	advantage no need to visit hospital no need for dialysis / tim no need for a restricted of no long term discomfort improved quality of life [max 1]	[1] ne not taken up with dialysis [1] liet [1] / pain [1] / lead a normal life [1]			
	disadvantage rejection of kidney [1] difficult to find suitable risk associated with oper need to take immunosup [max 1]	donor [1] ration [1] pressant drugs [1]			
5 (a)	DNA in nucleus (human) / wit in cytoplasm (bacteria) [hin nuclear membrane [1]			

presence of plasmid(s) (bacteria) [1] correct reference to chromosomes / AW (human) [1] genes / chromosomes paired (human) [1] [max 3]

- 5 (b) (cell) wall [1] (cell) membrane [1]
- 5 (c) type: asexual / binary fission / mitosis [1]

explanation: genetically + identical (cells produced) OR clones [1] all capable of producing insulin / same product [1] A: to produce insulin in large quantities / to produce a large number of bacteria / produce bacteria quickly

5 (d) <u>diabetes</u> [1]

Section B (30 marks)

- 6 (a) <u>280</u> [1]
- 6 (b) axes labelled Α y-axis: (mean) reaction time / ms x-axis: before drinking alcohol and after drinking alcohol / before and after / or key given x-axis labels approximately under each bar S columns at least half the grid on y-axis + even scale [1] Р both plots accurate $\pm \frac{1}{2}$ small square [1] С columns not touching + of same width [1] 6 (c) 220-350 + milliseconds [1] 6 (d) cirrhosis (of liver) / (chronic) liver disease [1] cancer of the liver / stomach / mouth (oral) / throat [1] pancreatitis / kidney failure / liver failure [1] stomach ulcers [1] brain damage [1] heart disease / heart failure / heart attack / stroke / high blood pressure [1] reduced fertility [1] depression / AW [1] addiction / dependence [1] [max 3] 6 (e) violent crime / domestic violence [1] road accidents / drink driving [1] (petty) crime / vandalism [1] family breakdown / divorce / relationship breakdown [1]

	impaired performance at work / unemplo [max 1]	oyment / difficulty getting a job [1]	
7 (a)	timber/paper + manufacture / AW [1] firewood [1]	A: wood unqualified A: fuel	
	<i>clearance for</i> agriculture [1] urbanisation / roads / housing / factories extraction of minerals / for other natural [max 2]	/ industry / leisure developments [1] resources [1]	
7 (b)	$118\ 545 - 90\ 883 = 27\ 662$ 27 662 / 118 545 × 100 [1] 23 + $\frac{96}{1}$ [1]		
7 (c)	planted forest + has one (dominant) species [1] loss of <u>biodiversity</u> [1] qualification of biodiversity loss (e.g. habitats / example / extinction of a species) [1] I: homes / organisms die (plantation) susceptible to pest / disease [1] nutrients removed / soils become infertile [1] A: use of chemicals ref to alien / foreign / invasive / non-indigenous species [1] AVP (e.g. vegetation is removed / lower canopy / all immature) [1] [max 2]		
7 (d)	mp 1 roots die so do not bind the soil [mp 2 loss of soil / soil erosion [1] mp 3 silting of rivers [1] mp 4 reduced (soil) fertility [1] A: loss of + minerals/ions/nutrier mp 5 no trees to absorb the water [1] mp 6 increased risk of flooding [1] mp 7 increased rate of evaporation / lan A: drought / decreased rainfall mp 8 desertification / decreased soil wa mp 9 loss of + habitat / places where on I: home mp 10 disruption to food chain / describ mp 11 endangered / extinction, of specie I: organisms die mp 12 AVP – named example of affecte trees cause nutrient cycling disruption / 1 [max 4]	1] Its Ind is exposed to drying [1] Iter [1] Irganisms live / described [1] Ited [1] Ites or loss of biodiversity [1] Ited 'land' organism in context / removed ack of decomposition [1]	
8 E (a)	production of <u>genetically identical</u> offspr from one parent [1] no gametes ref to (only) mitosis [1] [max 2]	ring [1]	

8 E (b) name of correct organism / crop / technique (e.g. cutting, micro-propagation, tubers, bulbs, layering, runners) [1]

	advant	age
	mp 1	fast [1]
	mp 2	always an exact / similar copy [1]
	mp 3	known characteristics / more certain outcome / AW [1]
	mp 4	only one parent/individual needed [1]
	mp 5	can be conducted in controlled conditions [1]
	mp 6	not reliant on pollination (agent) [1]
	mp 7	colonise new areas quickly / if the parent is well adapted to the environment the
		offspring will be also / [1]
	mp 8	higher yield / AW [1]
	[max 5	[·]
	disadva	antage
	mp 9	little/no + variation [1]
	mp 10	disease / change in environmental conditions + likely to kill all organisms / AW
	mp 11	limited ability to adapt to environmental changes / AW [1]
	mp 12	no dispersal + so competition (with parent / others) likely [1]
	[max 3	
	I: adva	ntage/advantage not qualified
	[max 8	5]
8 O (a)	release	e of an, egg / ovum / oocyte [1]
	either	falliala/assams
	from +	Tomcle/ovary
	$\frac{\partial r}{\partial t}$	aviduat / fallanian tuba [1]
8 O (b)	mp 1	zygote / fertilised egg + divides [1]
	mp 2	mitosis / cell division [1]
		I: embryo forming after implantation
	mp 3	forms + an embryo [1]
		A: blastocyst / blastula
	mp 4	(hollow) ball / collection / group / AW + of cells [1]
	mp 5	goes/moves + down oviduct / down fallopian tube / towards uterus [1]
	mp 6	by ciliary action / peristalsis / muscle contraction [1]
	mp 7	implants / AW + into lining of the uterus / uterine lining / endometrium [1]
		A: "embeds"
	0	
	mp 8	growth / development + of placenta [1] R: zygote implates
	mp 9	Tollicle becomes + yellow body / corpus luteum / remains of follicle / AW [1]
	mp 10	corpus luteum / ovary / Aw + secretes/releases/produces progesterone [1]
	mp 11	R: "wall"

mp 12 progesterone + prevents menstruation [1]

mp 13 inhibition of FSH (secretion / release) [1] mp 14 prevents + production of more eggs / production of follicles [1] [max 7]

8 O (c) (named) drug (e.g. FSH / clomiphene / clomid) + injected/taken [1] stimulates + production/development/maturation/release + follicles/eggs/ova/oocytes [1] more eggs are released [1] A: inhibits action of oestrogen A: makes sure that FSH concentration is high enough A: LH stimulates + ovulation / release of eggs [max 1]

trendyline