



ASSESSMENT and
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ALLIANCE

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GCE

Biology/ Human Biology A

Unit BYA7

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Unit 7: The Human Lifespan

Question 1

- (a) (i) B; 2
- (ii) D; 2
- (b) (i) (Arrows) from body tissues up to and into right atrium; [*Reject: If arrow points down umbilical vein to placenta*]
 Into right ventricle and ductus arteriosus, then to umbilical artery and placenta/
 into left atrium and left ventricle, then to umbilical artery and placenta; 2
 [*Reject: If arrow passes from lungs*] [*Accept: Arrows alongside structures*]
- (ii) Made up of a group of/ several tissues (performing a specific function/
 transporting blood); 1
- Total 5 marks

Question 2

- (a) (Pressure) deforms/ opens (sodium) channels/ pores/ gates;
 [*Ignore: Deforms corpuscle*]
Entry of sodium ions; [*Reject: Any other ion*] [*Accept: Error carried Forward of 'wrong' ion*]
 Causes depolarisation/ change in membrane potential/ generator potential;
 Reference to threshold potential; max 2
- (b) Sensory neurone correctly drawn and labelled;
 Relay neurone correctly drawn and labelled;
 Motor neurone correctly drawn and labelled; 3
 (Synapses need not be labelled)
 [*Note: If relay neurone is positioned incorrectly, then can allow marks for the other two if they are drawn correctly and synapse with the relay neurone*]
 [*Note: 1 mark if all 3 structures labelled correctly but drawn in white matter*]
- Total 5 marks

Question 3

- (a) Myosin; [*Reject: any other protein*] 1
- (a) A band - stays the same width/ nothing;
 I band - becomes narrower/ shorter/ smaller; [*Accept: Contracts*] 2
- (b) Correct working of $\frac{48 \times 1000}{1.6}$ / or equivalent;
 = 30,000 ×; 2
 [*Note: Allow 2 marks for correct answer even if no working shown but max 1 mark if units of measurement given*]
- Total 5 marks

Question 4

- (a) (i) Maintains/ allows efficient/ high level of activity/ movement;
[Ignore: Remain active] 1
OR Allows/ maintains high/ efficient level of enzyme reactions;
[Ignore: Reactions still occur]
- (ii) Requires more/ high amount of energy/ food/ respiration rate;
[Ignore Loss of energy/ heat] 1
- (b) (i) Evaporation of sweat removes heat from skin;
High(er) rate of sweating leads to low(er) skin temperature;
[Ignore: Description only and Vasodilation references] 2
- (ii) Change/ fall in body/ core temperature results in reduced sweating;
[Reject: Stops sweating]
Reduced sweating results in increase in body core temperature/ body
core temperature returns to original level; [Ignore: Hypothalamus and
receptors references]
(This) results in subsequent increase/ return to original level of
sweating; [Ignore: Description only] max 2

Total 6 marks

Question 5

- (a) Binds to/ removes/ releases hydrogen ions; 1
- (b) (i) 17-19% (ie double the y axis intercept for B-globin percentage);
Adult Hb molecules contain α and β globin chains/ half of adult Hb chains
are B (chains); [Ignore: Adult forms are α and β globin] 2
- (ii) Each polypeptide/ globin chain coded for by a separate gene;
[Reject: Different proteins]
Idea of different genes active/ suppressed at different times; 2

Total 5 marks

Question 6

- (a) The energy used/ released/ oxygen consumed/ rate of respiration when a person is resting/
inactive; [Reject: Energy used for respiration]
But awake; 2
- (b) Tall thin people have higher surface area (to volume);
Greater heat loss/ greater respiration/ metabolism required to maintain core/
body temperature;
OR Shorter/ broader man has more fat/ less muscle; [Ignore: Reference to 'lean']
Muscle tissue has higher metabolic rate; [Ignore: Insulation by fat] 2

Total 4 marks

Question 7

- (a) (i) (A study of) the same/ a group of people over a (long) period of time; 1
- (ii) Qualified reason why it is difficult to continue the measurement of all people
e.g. migration/ death;
- OR Takes a long time to see a pattern/ conclusion; 1
[Ignore: Takes long time to collect data]
- (b) 12 years; [Reject: If 2 ages given]
Greatest standard deviation/ widest bars/ longest line/ range is from 136-162; 2
- (c) Compared to girls' growth rate curve:
Taller peak;
Later peak; [Reject: If additional earlier peak drawn] 2
- (d) Needed for haemoglobin;
Increased blood volume/ no. of red blood cells (due to size);
Menstruation/ menstrual loss of blood; [Accept: Loss of blood in 'periods']
[Ignore: Menstrual cycle]
Reference to fetus/ baby (during pregnancy); max 3
- (e) Any valid difference between head and height pattern in terms of rate/ absolute growth/ age;
Reference to brain and early learning/ development/ co-ordination (so fully developed at
early age;
OR Surge of growth hormone increases height (between 10 and
12 years); 2
- (f) EITHER
1 Gene cut out with restriction enzyme; [Ignore: 'endonuclease' only]
2 Same enzyme used to cut open plasmid;
[Ignore: Vector unless qualified by plasmid reference]
3 Production of sticky ends;
- OR
1 Use reverse transcriptase/mRNA to produce gene/ DNA;
2 restriction enzyme used to cut open plasmid;
3 Add sticky ends;
- THEN
4 Join by ligase;
5 Plasmid/ 'new' gene/ human DNA taken up by bacteria;
6 Use of genetic marker to identify/ isolate modified bacteria;
7 (Modified) bacteria reproduce rapidly/ in large numbers/ reference to industrial process or
container;
8 All bacteria genetically identical/ contain (growth hormone) gene/ (growth
hormone) DNA; max 4

Total 15 marks

Question 8

- (a) (i) Circle drawn to include '+30' region of neurone;
Reference to depolarised membrane/ change in membrane opening potassium channels;
- OR Idea that 'this is voltage to start repolarisation'; 2
- (ii) Arrow pointing to left hand margin of paper plus written idea that impulse has passed the
-75mV point; = 1 mark
Arrow pointing to left hand margin of paper plus reference to hyperpolarisation/ description
in terms of ion flow;; = 2 marks 2
[Accept: Description of repolarisation including 'overshoot']
[Reject: Both marks if arrow incorrect]
- (b) Oxygen used in respiration; [Reject: Anaerobic reference]
Valid reference to ATP/energy; [Reject: Production of energy]
(For) sodium-potassium pump/ active transport of ions/ uptake/ synthesis of transmitter/
vesicle movement;
(Higher rate of impulses means) more/ high amount of sodium ion entry/
potassium ion loss/ transmitter uptake/ release/ vesicle movement; 4
- (c) (i) Accurate line of best fit;
Correct working shown, i.e. distance as a number using candidate's line;
Time as a number
Correct answer in mm/ms/m/s using candidate's line; 3
[Note: Allow 2 marks for correct answer in mm/ms or equivalent even if
no best fit line or working shown]
- (d) (i) (Loss of myelin means) no saltatory conduction/ impulses cannot 'jump'
from node to node;
Impulses must pass through greater amount of membrane;
[Ignore: Must travel entire length of axon/ neurone]
(Increased width of synapses) longer needed for diffusion/ movement/ greater distance to
receptors/ further to stimulate (post-synaptic) membrane/ further diffusion distance;
[Ignore: Further to travel]
Of transmitter (across synapse); [Accept: Chemical messenger] max 3
- (ii) Decreased stroke volume/ volume of blood pumped per beat/ cycle; 1
[Ignore: 'Less powerful muscle' unless qualified by reference to volume pumped out]

Total 15 marks

Question 9

- (a)
- 1 Release of pepsinogen in stomach;
 - 2 Converted to pepsin by action of pepsin/ HCl;
 - 3 (Chymo) trypsinogen released from pancreas;
 - 4 Converted to (chymo) trypsin by action of (chymo) trypsin/ enterokinase;
 - 5 Pepsin/ trypsin/ endopeptidase/ converts polypeptides/ proteins into smaller/ shorter chain peptides/ polypeptides;
 - 6 Small/ short chain peptides converted to amino acids by exopeptidases/ dipeptides to amino acids by dipeptidases;
 - 7 Reference to aminopeptidase/ dipeptidase in epithelial cell membrane;
 - 8 Carboxypeptidase in pancreatic juice;
 - 9 Reference to hydrolysis reaction/ breaking of peptide bonds;
 - 10 Correct reference to action of endopeptidase/ exopeptidase in terms of position of breaking (peptide) bond(s) in substrate; max 6
- (b)
- Secretin
Stimulates:
Production/ secretion of bile/ alkali from liver;
Production/ secretion of alkali from pancreas; [*Ignore: Pancreatic juice*]
[*Reject: Enzyme secretion*]
Smooth muscle contraction/ emptying of gall bladder; [*Ignore: References to bile duct*]
Inhibits gastric gland secretion;
- CCK
Stimulates:
Production/ secretion of (named) enzymes from pancreas; [*Ignore: Pancreatic juice or alkaline fluid*]
Smooth muscle contraction/ emptying of gall bladder; [*Ignore: References to bile duct*] max 4
- (c)
- 1 Idea that type/ structure/ arrangement of teeth is influenced by genes;
 - 2 Reference to unchanging conditions/ same omnivorous diet/ need omnivorous diet to survive;
 - 3 Variation in types of teeth between individuals;
 - 4 Reference to mutation;
 - 5 Reassortment during meiosis;
 - 6 Extreme phenotypes less able to benefit from omnivorous diet/ selected against;
 - 7 These individuals less able to find mate/ breed/ reproduce/ omnivores more likely to reproduce/ breed/ mate; [*Ignore: 'Survival of the fittest'*]
 - 8 Maintains small variation in type/ arrangement of teeth/ allele frequency;
 - 9 Around same 'mean' value; max 5

Total 15 marks