

Question	E Answers	Marks	Guidance
1 (a) (i)	<u>diffusion</u> ; used in (aerobic) respiration ;	[2]	
(ii)	any <i>two</i> from water glucose / simple sugars / named amino acids salts / ions / named ion / minerals vitamins AVP e.g. vitamins	[1]	<b>NB 2 substances required for one mark.</b> <b>R</b> sugar unqualified <b>A</b> protein
(iii)	any <i>two</i> from carbon dioxide water protein / amino acids / hormone / named hormone / enzyme urea lactic acid AVP e.g. vitamins	[1]	<b>NB 2 substances required for one mark.</b> <b>R</b> sugar / waste unqualified <b>A</b> metabolic waste / glucose
(b)	<b>D</b> pores / holes / gaps in capillary wall / AW ; <b>E</b> allows filtration /movement of small molecules (between blood and tissue fluid) ;  <b>D</b> thin wall / wall is one cell thick / thin lining ; <b>E</b> short diffusion distance / AW ;  <b>D</b> small / thin / narrow / AW ; <b>E</b> blood moves slowly (for exchange) / more cells <i>or</i> blood close to wall ;  <b>D</b> large numbers of capillaries /capillary bed ; <b>E</b> provide large surface area ;	[2 + 2]	<b>NB</b> <b>Descriptor(D) must be linked to an Explanation(E) for 2 marks</b> <b>D alone can gain a point</b> <b>E alone cannot score</b> <b>1 + 1 and 1 + 1</b>  <b>R capillary one cell thick</b>
(c) (i)	lymph (vessel) ;	[1]	not lymphatic system or node IGNORE lacteal
(ii)	squeezed by muscles / AW ; valves, ensure one-way flow / prevent backflow ; passive not pumped ;	[max 1]	<b>R</b> valves unqualified
		<b>[Total: 10]</b>	

Question	E	Answers	Marks	Additional Guidance
2 (a)		muscles / surrounding tissues, contract / squeeze, vessels ; valves, prevent backflow / ensure one way flow ; ref. to breathing (lowering pressure in chest) ;	[2]	
(b)	1 2 3 4 5	fat / fatty acids (and glycerol), absorbed (in ileum ) ; ref. to making fat water soluble ; fat enters lacteals ; lacteals, empty into lymph vessels / are part of lymphatic system ; AVP ; e.g. transport of fat in lymph may reduce risk of plaque arteries	[max 2]	other possible AVP <i>idea that</i> not overloading blood with fat / by-passes the liver / goes to adipose tissue first
(c) (i)		mitosis ;	[1]	
(ii)		antibody ;	[1]	
(iii)		ref. to antibodies in context of, immobilising / 'marking' / agglutinating, bacteria ; phagocytosis (by cell <b>R</b> ) ; (bacteria) ingested / engulfed ; into a, vacuole / vesicle ; digested / broken down ; by, enzymes / acid ;	[max 3]	<b>A</b> any alternative wording for effect on bacteria <b>A</b> cell <b>R</b> is a phagocyte <b>I</b> 'killed' / destroyed (in question) unless qualified

Question	E	Answers	Marks	Additional Guidance
2 (d)	1 2 3 4 5	positive correlation ; more antibiotics used, more bacteria are resistant ; variation between countries at each dosage ; data quote 1 ; data quote 2 ; e. countries with antibiotic use of <1%, less than 10% bacteria are resistant countries with antibiotic use of 3(+)% , more than 40% bacteria are resistant  variation – e.g. some countries at 2.5%, with 4.5% and 32.5%	[max 3]	data quotes must have figure (or range) for use of antibiotics and % resistance
(e)	1 2 3 4 5 6 7 8 9 10	<i>accept ora</i>  bacteria are resistant to some antibiotic ; ref. to selection ; result of overuse ; some are specific ; some antibiotics used for rare disease(s) ; some only used as last resort ; have (many / unpleasant) side-effects / harmful / cause allergy ; too expensive ; cannot be used on children ; AVP ; ref. to other uses, e.g. on animals	[max 3]	R <u>people</u> become, immune / resistant
			<b>[Total: 15]</b>	

Question	E Answers	Marks	Additional Guidance
3 (a)	<b>A</b> – hair ; <b>B</b> – (temperature) receptor ; <b>A</b> (sensory) nerve ending <b>C</b> – sweat gland ; <b>D</b> – fat (cell) ;	[4]	<b>R</b> follicle <b>A</b> neuron <b>R</b> nerve  <b>A</b> fat layer / fat tissue / adipose / lipid <b>R</b> ‘fat droplet’
(b)	<p style="text-align: center;"><i>marking points are linked 1 + 2, etc.</i></p> <p><i>hair / A</i>  <b>1</b> raises hair + traps air ; <b>A</b> ORA  <b>2</b> air is (good) insulator ;</p> <p><i>temperature receptor / B</i>  <b>3</b> detects change in temperature ;  <b>4</b> impulses to the, CNS / brain / spinal cord ;</p> <p><i>sweat gland / C</i>  <b>5</b> secretes / produces, sweat + evaporates from surface of skin ; ORA  <b>6</b> heat lost from the body / blood cooled / AW ; ORA</p> <p><i>fat / D</i>  <b>7</b> insulator ;</p>	[max 4]	<p><b>NB</b> if structures in (a) labelled incorrectly allow <i>ecf</i></p> <p><b>if</b> structure is not on the mark scheme, but correct and appropriate function is given, allow <b>one</b> mark (<i>ecf</i>)</p> <p><b>(BUT</b> if unqualified letters are used must link to what is given in (a))  <i>e.g. D is an artery/blood vessel in (a) – ✗</i>  <i>D vasodilates if too hot in (b) – ✓</i></p> <p><b>R</b> ‘signals/messages’ in MP 4</p>

Question	E	Answers	Marks	Additional Guidance
3 (c)		<p><i>mark (i) and (ii) together to max 5</i></p> <p>(i) 1 (vaso)constriction ;  2 shunt / AW, opens ;  3 less blood flows through the <u>capillaries</u> ;  4 blood diverted away from, skin / surface ;</p> <p>(ii) 5 <i>idea that</i> blood distributes heat ;</p> <p><i>less heat loss</i>  6 by radiation ;  7 by convection ;  8 accept by conduction (to the air) ;</p>	[max 5]	<p><b>R</b> vasoconstriction of veins/capillaries  <b>Do not accept</b> 'capillaries move away' / AW or ref to muscles in capillaries</p>
(d)		<p>change in, body / skin, temperature ;  2 acts as a stimulus ;  3 to keep temperature , constant / at 37 °C / within limits / near set point / at the norm / AW ;  4 corrective / opposite / AW, action by the body ;  e.g. qualified ref to sweating / vasodilation  vasoconstriction / AW ;</p>	[max 3]	<p><b>I</b> ref. to external temperature changes  <b>A</b> correct ref. to homeostasis  the example needs to show how it brings about the corrective action</p>
			<b>[Total: 16]</b>	

- 4 (a) (i) gut / alimentary canal / oesophagus / small intestine / ileum / duodenum / large (A big) intestine / colon / rectum / intestine / AW ; stomach [1]
- (ii) hepatic portal vein ; A hephatic R HPV [1]
- (b) (i) *answers may be in space below question*  
 A – nucleus ;  
 B – cell / plasma, membrane ; A plasmalemma  
 C – cytoplasm ; [3]
- (ii) *award two marks if correct answer (between 1983 – 2017) is given, ignore units*  
*award one mark if incorrect measurement is divided by 0.06*  
*allow +/- 1 mm in reading the line*
- 120 (mm) / 0.06 (mm) 12 (cm) / 0.006 (cm)  
 2000 ;; A 1983 – 2017 [2]

4 (c) *award in either section*

- 1 ref to enzymes (within liver cells) ;
- 2 ref to negative feedback / homeostasis ;  
A 'concentration returns to normal' / 'reduces glucose level' / AW

*penalise once if insulin / glucagon are described as acting like enzymes – MP5/7*

*ignore incorrect source of hormone(s)*

*penalise once if starch is given instead of glycogen and if glycogen is misspelt*

*blood glucose concentration is higher than normal*

- 3 insulin ;
- 4 glucose, enters / diffuses into / goes into / absorbed (by liver / cells) ;
- 5 (liver cells) store glucose as glycogen / convert glucose to glycogen ;  
A increase respiration / increase metabolism of glucose / storage of fat / AW

*blood glucose concentration is lower than normal*

- 6 glucagon ;
- 7 (liver cells) convert / break down, glycogen to form glucose ;
- 8 glucose, goes out of cells / enters the blood ;

[5 max]

- (d)
- 1 makes (named) protein / protein synthesis / forms peptide bonds / are assimilated ;
  - 2 (excess are) broken down / deaminated ;
  - 3 removal of, amino group /  $-NH_2$  / nitrogen-containing part ; R nitrogen unqualified
  - 4 (to form) ammonia ;
  - 5 converted to urea ;A amino acids are, broken down / converted, to urea
  - 6 rest of molecule (A carbohydrate), is respired / used to provide energy / stored ;
  - 7 transamination / described ;

[3 max]

[Total: 15]