

Question number	Answer	Marks	Guidance
1 (a) (i)	A Anaerobic respiration; C Glycogenesis;	2	
1 (a) (ii)	Glycogen;	1	
1 (a) (iii)	Liver;	1	
1 (b)	Homeostasis is the maintenance of constant internal environment; lactate lowers pH; removal of lactate maintains (normal) pH; glucose production maintains blood glucose concentration;	4	
1 (c)	High concentrations of lactic acid are toxic; so must not accumulate; lactic acid is energy resource; recycled; produced when energy demand is high;	5	
2 (a)	A hepatocyte; B hepatic artery / bile duct;	2	
2 (b)	C deamination; D carbon dioxide; E urea; F water;	4	
3 (a)	Region P – cortex; Structure Q – ureter; Structure R – pelvis; Structure S – pyramid; Structure T – renal vein/renal artery;	5	
3 b (i)	Afferent arteriole; efferent arteriole; glomerulus; Bowman's capsule;	4	
3 b (ii)	Afferent arteriole has larger diameter than efferent arteriole; high(er) hydrostatic pressure in capillary network (glomerulus); basement membrane between, endothelium/capillary wall, and epithelium (wall of Bowman's capsule); filtration of blood to form filtrate;	4	
c	1 (large) protein / amino acids, present; 2 blood (cells) present; 3 glucose present; 4 more water present / more dilute; 5 more, ions / salts / electrolytes , present; 6 (more) vitamins present; 7 cells/large proteins, unable to pass through basement membrane; 8 filtrate formed from water and solutes;	4	Mark as prose - award marks wherever they occur 1 ACCEPT more, protein / amino acids ACCEPT appropriately named protein e.g. albumin / antibodies / immunoglobulins 3 DO NOT CREDIT more glucose
d (i)	protein / polypeptide;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE alpha helix / intrinsic / transmembrane DO NOT CREDIT glycoprotein
d (ii)	1 the ions (in solution) are too large to pass through the channel or		Mark the first two suggestions 1 ACCEPT gap / hole for channel 3 DO NOT CREDIT repels and/or

	the channel is too narrow for the ions (in solution) to pass through; 2 shapes not compatible; 3 idea that positive charge (in the channel) repels the (positively charged) ions;		attracts
4 (a)	(initially) metabolic rate decrease as the ambient temperature increases; (after plateau/at higher ambient temperature) metabolic rate increases as ambient temperature increases; rate of increase is slower than rate of decrease;	3	
4 (b)	hypothalamus;	1	
4 (c)	increased rate of metabolism leads to increased rate of respiration; <i>idea that</i> respiration is not 100% efficient; energy is released as heat;	3	
4 (d)	respiration depends on enzymes; activity of enzymes if increased with increasing temperature; increased activity of enzymes increases rate of respiration;	3	
4 (e) (i)	<i>brown adipose cell</i> more mitochondria; larger nucleus; small droplets of fat; ORA	3	
4 (e) (ii)	mitochondria are site of link reaction/Krebs cycle/oxidative phosphorylation; more energy released from respiratory substrates; small droplets of fat have greater SA/vol ratio increasing rate of breakdown;	3	
4 (f)	energy released due to electron transfer; is not used to synthesise ATP;	2	