

1	(a)	central (nervous system) ; peripheral (nervous system) ; spinal cord ;	[3]	R spine
	(b) (i)	sensory neurone ;	[1]	A afferent neurone R sensory nerve
	(ii)	simple reflex / reflex ;	[1]	A reflex arc
	(iii)	slower / takes more time ; needs thought / uses (higher centres of) the brain / conscious control ; learnt / not inherited / not innate / needs training / AW ; not automatic ; response is not always the same to the stimulus ;	[max 2]	
	Question		Mark	Guidance
	(c) (i)	<i>either</i> pot P – (uniform) light AND pot Q – no light / dark / covered (up) ; <i>or</i> pot P – (uniform) with / plus, magnesium AND pot Q – no magnesium ;	[1]	A pot P has all nutrients
	(ii)	positive ; (photo)tropism / (photo)tropic ;	[2]	R (photo)trophic / geotropic / gravitropic
	(iii)	<i>idea that</i> leaves / seedlings / plants / chloroplasts, get more light ; more (light) <u>energy</u> , absorbed / trapped / AW ; more photosynthesis ; more, growth / biomass / glucose / starch / AW ;	[max 2]	'more' is only required once
	(iv)	(auxins) made / produced, in (shoot), tip / apex ; pass / move / diffuse / spread (down the stem) ; auxins collect in the side, in the dark / away from light ; greater (cell) elongation on side in the dark ; AVP ; e.g. absorption of water (by osmosis) / stretching of cell walls / phototropin(s) / plants detect <i>or</i> sense light / ref to turgor pressure	[max 4]	I 'found, in / on' A 'dark / shaded, side' I comments about roots
			[Total: 16]	

2 (a)	<table border="1"> <thead> <tr> <th>name of part</th> <th>letter from Fig. 3.1</th> </tr> </thead> <tbody> <tr> <td>hair</td> <td>R ;</td> </tr> <tr> <td>blood vessel / arteriole / small artery</td> <td>S ;</td> </tr> <tr> <td>sweat gland</td> <td>U ;</td> </tr> </tbody> </table>	name of part	letter from Fig. 3.1	hair	R ;	blood vessel / arteriole / small artery	S ;	sweat gland	U ;	[3]	1 mark per correct row R artery, capillary
name of part	letter from Fig. 3.1										
hair	R ;										
blood vessel / arteriole / small artery	S ;										
sweat gland	U ;										
(b)	(involuntary responses are) automatic / no conscious decision / does not involve thought / decision making / innate / reflex ; (higher centres of) brain not involved ; faster / immediate / rapid ; response always the same / response specific to stimulus ; may involve glands ; they are protective / linked to survival / AW ; AVP ;	max [3]	A reverse argument written in favour of voluntary responses if this is clearly stated								
(c)	(change in) temperature / hot / cold is stimulus ; temperature receptors (in skin) / V ; (electric) impulse ; travels through sensory neurone ; to brain ; relay / connector / intermediate neurone ; motor neurone ; to effector ; example of effector (arteriole / erector, muscle) ;	max [4]	R messages points need to be in the correct sequence A 'muscle' unqualified.								
(d)	change in temperature, is detected / acts as a stimulus ; to keep temperature, constant / at 37 °C / within limits / near set point / at the norm / AW ; corrective / opposite, action by the body ; return to normal temperature ; correct ref to homeostasis ;	max [3]									
		[Total: 13]									

3 (a)	hepatic portal vein ;	[1]	
(b)	(semi lunar) valves ; prevent backflow ; large, lumen ; low, pressure / resistance to blood flow ; thin / less elastic / less muscular, walls (than arteries) ; low blood pressure ; allows vein to be squeezed by (surrounding skeletal) muscles ;	2 + 2 max [4]	in each case the explanation must be linked to a correct feature
(c)	= $(181 - 135) \div 135 (\times 100)$; = 34 (%) ;;	max [2]	
(d) (i)	(liver) responds to insulin (from pancreas) ; increased, uptake / respiration, of glucose ; glucose converted to glycogen ; by enzymes ; glycogen is, insoluble / stored ; negative feedback ;	max [2]	A glycogenesis R hormones carrying out conversions directly ignore homeostasis
(ii)	temperature ; water ; AVP ; e.g. pH / ions / urea / carbon dioxide	max [1]	

3 (e)	deamination ; (part of excess) amino acids converted to urea ; (part of) amino acid converted to ammonia ; ammonia converted to urea ; ammonia is harmful ; (rest of) amino acid molecule, releases energy / converted to glucose / glycogen / respired ; (some amino acids) used to make proteins e.g. fibrinogen ; AVP ; e.g. transamination	max [3]	A description of amino group removal ignore protein converted to urea
(f)	bile production / AW ; breakdown / remove, hormones / red blood cells / toxins / alcohol / drugs ; storage of, iron / vitamin A / vitamin D ; AVP ; e.g. cholesterol, synthesis / AW	m [1]	R homeostasis, deamination, protein synthesis, transamination
		[Total: 14]	

4 (a) (i)	eaten / absorbed, a (sugary / high carbohydrate) meal / AW ; (secretion / effect, of) adrenaline ; (secretion / effect, of) <u>glucagon</u> ; dehydration / loss of water ;		max [1]	
	(ii) used in <u>respiration</u> ; (named) exercise / physical activity ; hungry / fasting / starvation ; (secretion / effect, of) insulin ;		max [1]	
	(iii) liver ; muscle ; kidney ; testes ;		max [2]	
(b)	1	pancreas / islets of Langerhans, detects increase in glucose concentration ;	max [3]	
	2	(pancreas / islets) secretes / produces, insulin ;		
	3	transported in, blood / plasma ;		
	4	liver / muscle / cells, convert glucose to <u>glycogen</u> ;		
	5	ref to, enzymes (converting glucose to <u>glycogen</u>) ;		
	6	<u>homeostasis</u> / <u>negative feedback</u> ;		
(c)	water, diffuses out of (red blood cells) ; through, partially permeable membrane ; by osmosis ; down water potential gradient / from high water potential to low water potential ; (red cells) decrease in volume / shrink / crenated / AW ;		max [3]	