

01. 0610_s17_MS_41 Q: 3

	Answer	Mark	Partial Marks
(a)	any, chemical / substance, taken into / AW, the body ; modifies / affects / changes / AW, (chemical) reactions / metabolism ;	2	I behaviour
(b)	1 vesicles (containing neurotransmitter) move to the cell membrane ; 2 vesicles fuse with cell membrane ; 3 release of neurotransmitter ; 4 (neurotransmitters/chemicals) diffuse across, synapse / synaptic cleft or gap ; 5 neurotransmitter binds to, receptor / protein on cell surface ; 6 neurotransmitter and receptor are complementary / AW ; 7 results in an impulse in, relay / next, neurone ;	4	A stimulates the, relay / next, neurone
(c)	neurotransmitter released / vesicles, on one side of synapse ; receptors / described, only found on the opposite side of synapse ;	2	
(d)	1 heroin is converted into morphine ; 2 heroin diffuses into synapse ; 3 heroin binds to receptors (for neurotransmitter) ; 4 ref to, endorphin / enkephalin, receptors / neurotransmitter ; 5 ref to heroin being complementary to receptor ; 6 blocks neurotransmitter entering receptor site ; 7 (or) stimulates receptor ; 8 reduced / increased, pain perception ; as appropriate 9 AVP ; morphine stimulates release of dopamine acts on relay neurone even when no impulse in neurone B	3	A competes for binds R 'same shape' as receptor I ref to summation A antagonist A agonist
(e)	light ; temperature / heat / cold ; sound / vibration ; chemicals / taste / smell / pH ; pressure / touch ; position / gravity ; movement ; stretch (in muscle / tendons) ;	3	

02. 0610_s17_MS_43 Q: 6

	Answer	Mark	Partial Marks
(a)	(disease is caused by) a pathogen ; passes from one host to another ;	2	
(b)	1 electrical signal ; 2 passes along / AW, a, nerve cell / neurone ; 3 in one direction ;	2	1 impulse
(c)(i)	1 (vaccine contains) harmless / attenuated / dead / AW, form of, (named) pathogen / antigen ; 2 (antigens / vaccine) stimulate an immune response ; 3 ref to lymphocytes ; 4 lymphocytes / white blood cells, make antibodies ; 5 ref to specificity ; 6 production of memory cells ; 7 rapid, immune response / AW, if exposed to same, pathogen / antigen ; 8 gives long-term immunity ; 9 AVP ;	4	
(c)(ii)	1 bacteria may still be present (in the population) ; 2 in carriers / in people who have no symptoms ; 3 infected people moving into the, country / area / AW ; 4 if few people are, immune / vaccinated, bacterium is more likely to be transmitted ; 5 idea of herd immunity ; 6 some people cannot respond to, antigens / vaccines ; 7 protects people who travel to other countries ; 8 booster vaccinations are sometimes required) / AW ;	2	MP5 A new people arriving in a country (who are not vaccinated) MP6 e.g. people with HIV / babies / elderly
(d)(i)	1 antibodies are made of protein ; 2 proteins / antibodies, are digested / denatured, in the alimentary canal ; 3 direct route to site of infection ;	2	
(d)(ii)	1 no (active) immune response ; 2 no memory cells ; 3 antibodies are broken down in the body ; 4 antibodies are not made by body's own lymphocytes ;	2	

03. 0610_s19_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	long, to transmit (impulse), over (long) distance / faster / direct connection ; mitochondria to (release energy), for transmission impulse / protein synthesis / active transport / making (neuro)transmitters ; vesicles to, carry / hold / release, chemicals / (neuro)transmitters (into synapse) ; (neuro)transmitters are released, to allow connection to other neurones / across a synapse ; receptors / vesicles, allow unidirectional transmission ; AVP ;	3	
(a)(ii)	brain and spinal cord (only) ;	1	
(b)(i)	stimulus / light (detected by) retina / rod / cone / receptor ; <i>reference to</i> (electrical) impulse / electrical signal ; sensory neurone → relay / connector, neurone → motor neurone ; <i>reference to</i> synapses between neurones ; effector / (circular) muscles (in iris), contract / respond ;	3	
(b)(ii)	automatic / involuntary ; receptors / neurones / nerve, still function ;	1	
(c)(i)	E – vesicle ; F – neurotransmitter ; G – (neurotransmitter) receptor (molecule / site / protein) ;	3	
(c)(ii)	arrow drawn from right to left, pointing left ;	1	

	Answer	Mark	Partial Marks																					
(a)(i)	<u>stem</u> (cells) ;	1																						
(a)(ii)	nucleus / nucleolus / nuclear membrane ; cell membrane ; cytoplasm ; ribosomes ; mitochondria ; endoplasmic reticulum / ER ; vesicle / vacuole ; AVP ;	2	R large permanent vacuole A Golgi apparatus, lysosome, centrioles																					
(a)(iii)	(transmit impulses) from one (distant) part of the body to another / AW; so (impulse) is fast / AW ;	1																						
(b)(i)	motor (neurones) ;	1																						
(b)(ii)	muscle ; gland ;	1																						
(c)(i)	<table border="1"> <thead> <tr> <th>letter from Fig. 4.1</th> <th>name</th> <th>description</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>mitochondrion / mitochondria ;</td> <td>component of the cell that releases energy during aerobic respiration</td> </tr> <tr> <td>H</td> <td>neurotransmitters</td> <td>chemicals that transmit signals from one neurone to the next neurone</td> </tr> <tr> <td>J</td> <td>synapse ;</td> <td>the gap between two neurones</td> </tr> <tr> <td>F/G</td> <td>vesicle ;</td> <td>the sac in which neurotransmitters are transported to the cell membrane</td> </tr> <tr> <td>K</td> <td>receptors ;</td> <td>the molecules that the neurotransmitters bind to</td> </tr> <tr> <td>M</td> <td>nucleus ;</td> <td>the structure that controls the activities in the cell</td> </tr> </tbody> </table>	letter from Fig. 4.1	name	description	E	mitochondrion / mitochondria ;	component of the cell that releases energy during aerobic respiration	H	neurotransmitters	chemicals that transmit signals from one neurone to the next neurone	J	synapse ;	the gap between two neurones	F/G	vesicle ;	the sac in which neurotransmitters are transported to the cell membrane	K	receptors ;	the molecules that the neurotransmitters bind to	M	nucleus ;	the structure that controls the activities in the cell	5	one mark per correct row
letter from Fig. 4.1	name	description																						
E	mitochondrion / mitochondria ;	component of the cell that releases energy during aerobic respiration																						
H	neurotransmitters	chemicals that transmit signals from one neurone to the next neurone																						
J	synapse ;	the gap between two neurones																						
F/G	vesicle ;	the sac in which neurotransmitters are transported to the cell membrane																						
K	receptors ;	the molecules that the neurotransmitters bind to																						
M	nucleus ;	the structure that controls the activities in the cell																						
(c)(ii)	brain / spinal cord / central nervous system / CNS ;	1																						
(d)	diffusion ; from high concentration to low concentration / down a concentration gradient ; direction described ; AVP ;	3																						
(e)	nerves faster / hormones slower ; nerve impulses are a short lived response / ora ;	1																						

05. 0610_m20_MS_42 Q: 3

	Answer	Mark	Partial Marks
(a)	as the ability to detect or sense stimuli in the internal or external environment ; and to make appropriate responses ;	2	
(b)	eye and skin ; AVP ;	1	apply list rule
(c)(i)	as a control / for a comparison / AW ; to see if blood glucose (concentration) was affected by an injection ; so there is no effect, on water potential / osmotic effect ;	2	
(c)(ii)	(before the injection) blood glucose was decreasing ; <i>after the injection:</i> peaks at 4.75 mmol per dm ³ ; increase is immediate / steep (after injection of adrenaline) ; less steep / gradual, decrease after peak ; decreases below initial starting value / below 4.4 or 4.5 mmol per dm ³ / decreases to 3.9 mmol per dm ³ ; <i>blood glucose increases</i> converts <u>glycogen</u> to glucose ; in the liver ; <i>blood glucose decreases</i> glucose used in respiration ; AVP ;; e.g. insulin causes blood glucose concentration to decrease / glucagon causes the blood glucose concentration to increase	5	
(d)	line sketched on the graph showing an increase ; increase starts after 2 hours ;	2	
(e)	<i>any two from:</i> widened / dilated pupils ; increased, pulse / heart, rate ; increased breathing rate ; increased blood pressure ; AVP ;;	2	apply list rule

- (a) ability to detect and respond to changes in the environment; [1]
- (b) correct label and name of:
sensory neurone;
relay / connector / intermediate neurone;
motor / effector neurone; [3]
- (c) automatic / no thought required / not a conscious action;
allow: no (higher centres in) brain involved
ignore: reference to speed of response
stimulus always leads to the same response;
allow: fixed response [2]
- (d) (i) a junction between two neurones; [1]
(ii) Any three from:
(an impulse triggers) the release of neurotransmitters (into the gap);
diffuse across the gap;
binds to receptors;
which allows the passage of the impulse; [max 3]
- (e) Any two from:
heart beats faster / increased pulse;
increased rate of breathing;
stimulates breakdown of glycogen in the liver;
increases blood glucose concentration;
dilate pupils;
heightened sensitivity / increased mental awareness / owtte;
allow: sharper senses / more alert / owtte [max 2]
- (f) Any one from:
nervous control is faster / ora;
hormonal control is longer-lasting / ora;
note: comparison must be made [max 1]
-

07. 0610_p16_MS_40 Q: 3

- (a) ability to detect and respond to changes in the environment; [1]
- (b) correct label and name of:
 sensory neurone;
 relay / connector / intermediate neurone;
 motor / effector neurone; [3]
- (c) automatic / no thought required / not a conscious action;
 allow: no (higher centres in) brain involved
 ignore: reference to speed of response
 stimulus always leads to the same response;
 allow: fixed response [2]
- (d) (i) a junction between two neurones; [1]
 (ii) Any three from:
 (an impulse triggers) the release of neurotransmitters (into the gap);
 diffuse across the gap;
 binds to receptors;
 which allows the passage of the impulse; [max 3]
- (e) Any two from:
 heart beats faster / increased pulse;
 increased rate of breathing;
 stimulates breakdown of glycogen in the liver;
 increases blood glucose concentration;
 dilate pupils;
 heightened sensitivity / increased mental awareness / owtte;
 allow: sharper senses / more alert / owtte [max 2]
- (f) Any one from:
 nervous control is faster / ora;
 hormonal control is longer-lasting / ora;
 note: comparison must be made [max 1]
-

Answer			Mark	Partial Marks	
(a)(i)	letter on Fig. 2.1	name of the fluid	contains red blood cells	2	1 mark for each correct column
	A	lymph	no		
	B	tissue	no		
(a)(ii)	diffusion ;		1		
(a)(iii)	(aerobic) respiration ; for the release of energy ; for a (named) metabolic process ;		2		
(b)	1 deliver / supplies, blood / oxygen / glucose (from arteries) to, capillaries / shunt vessels ; 2 controls blood flow, through capillaries / to the surface of the skin ; 3 by vasoconstriction / vasodilation ; 4 ref to (arteriole) muscle contraction / relaxation ; 5 ref to maintenance of body temperature / homeostasis / description of ;		3		
(c)	contains lymphocytes (which produce antibodies) ; filters the lymph ; ref. to immunity / defends against disease / ref. to destruction of (named) pathogens ;		2	A stores I produces	
(d)(i)	small intestine / villi ;		1		
(d)(ii)	fat, absorption / transport ;		1		

09. 0610_p20_MS_40 Q: 2

(a) Any three from:

muscular contraction / movement / pump blood;

allow: maintain posture

maintenance of body temperature;

active transport described / example such as nerve impulses;

metabolic reactions / named example (e.g. excretion / biosynthesis / digestion);

mitosis / nuclear division / cell division;

growth / replacement / repair;

making gametes / owtte;

avp;

[max 3]

(b) (i) respiration;

[1]

(ii) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

[1]

(c) Any four from:

takes time for;

oxygen debt (to be repaid);

more oxygen needed;

lactic acid / lactate;

builds up in muscles / needs to be cleared away;

lactic acid is broken down / respired;

[max 4]

(d) Any five from:

as body temperature increases;

vasodilation;

(relaxation / owtte) of arterioles;

allow: arteries

increase in supply of blood to skin capillaries;

(causes) loss of heat;

by, conduction / convection / radiation;

increase in blood flow to sweat glands;

increased production of sweat;

loss of heat by evaporation;

[max 5]

10. 0610_s20_MS_42 Q: 1

(a)(i)	(because it is made of) a group of tissues working together to perform specific functions ;	1
(a)(ii)	brain ;	1
(a)(iii)	A (thermo)receptor ; B sweat gland ; F fatty tissue / fat cell(s) ;	3
(a)(iv)	<i>any three from:</i> vasoconstriction (of arterioles / E) ; shunt vessels / D , dilate / widen ; less blood flow to skin (capillaries) / F ; reduces heat loss from blood ;	3
(b)	<i>any three from:</i> muscle contraction ; protein synthesis ; cell division ; active transport ; growth ; passage of nerve impulses ;	3

11. 0610_s18_MS_41 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	sensory neurone / (temperature / thermo-) receptor (neurone) ;	1	
(a)(ii)	Q venule ; S arteriole ; T capillary ;	3	
(a)(iii)	fat / fatty tissue ;	1	
(b)(i)	blood flow remains constant and then increases / AW ; blood flow remains at, 4 / 5% ; increase in blood flow from 25 (□) °C ; to, maximum / 100%, at 41 °C ;	3	
(b)(ii)	detection by, sensory neurone / receptor (in skin) ; brain / hypothalamus, as control centre / AW ; <u>impulses</u> in, motor / effector, neurones ; <u>muscles</u> in, shunt vessels contract / arterioles relax ; so shunt vessels, constrict / close ; arterioles dilate / <u>vasodilation</u> ; increased / more, blood flow, into capillaries / near surface (of skin) ;	3	A brain / hypothalamus, detecting temperature
(b)(iii)	46 (%) ;	1	
(b)(iv)	<u>diffusion</u> ; down concentration gradient / high to low concentration ; active transport ; through epidermis ; between / into / through, cells ; across cell membranes ; AVP ;	3	
(c)	(so that) enzymes do not denature / enzymes remain active / maintains optimum temperature for enzymes ; <i>idea of</i> maintaining a constant rate of, reactions / metabolism / respiration ; avoids to damage to other named (type of) protein ; avoids damage to cell membranes ; avoids, heatstroke / hyperthermia / overheating / dehydration / freezing / chills / becoming too cold / hypothermia ; at high temperature sperm production, reduced / harmed ; AVP ;	4	e.g. (permits) colonisation of different parts of the world / different climates active in, both day and night / different seasons
(d)	hormones are chemicals / hormonal coordination is only chemical ; transported in the, blood / circulatory system ; (effects are) slower (than nerves) ; ora (effects are) longer lasting ; ora each hormone may have more than one target, organ / tissue / cells ; ora	3	

12. 0610_w18_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	chemical substance produced by a (endocrine) gland ; carried by the blood ; alters the activity of specific target organs / AW ;	3	
(b)(i)	(A) 210 (mg 100 per cm ³) and (B) 88 (mg 100 per cm ³) ;	1	
(b)(ii)	136 (%) ;;	2	
(b)(iii)	increases / decreases, more steeply / faster ; increases to / has, a higher concentration ; reaches a peak / decreases, (much) later ; does not return to, starting concentration / original value / normal / AW ; any comparative use of figures with correct units ;	2	
(b)(iv)	increase in glucose concentration detected (by pancreas) ; insulin is, secreted / released (into the blood) ; role of the pancreas in, detection / secretion of hormones ; insulin, stimulates / AW, liver / muscle ; increase, uptake / respiration, of glucose ; glucose is converted to glycogen ; activation / AW, of enzymes (in liver cells) ; (blood) glucose concentration, decreases / maintained ; ref. to homeostasis / negative feedback ;	4	
(b)(v)	tiredness / lethargy / fatigue / described ; breathlessness ; dizziness / fainting / light-headedness / coma ; frequent urination / AW ; sticky / sweet, urine ; urinary tract infection / UTI ; recurrent thrush ; thirsty (all the time) / drinking lots of water ; dry mouth ; weight loss ; hunger / eating a lot of food ; sweet-smelling breath ; change(s) in behaviour ; e.g. irritability / confusion / mood swings nausea / vomiting ; blurred vision / blindness ; cuts / grazes / wounds, that do not heal ; AVP ;	3	

13. 0610_w17_MS_42 Q: 6

Answer			Mark	Partial Marks																	
(a)	<table border="1"> <thead> <tr> <th>blood vessel</th> <th>name of blood vessel</th> <th>oxygenated / deoxygenated</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>hepatic portal vein</td> <td>deoxygenated ;</td> </tr> <tr> <td>B</td> <td>(inferior) vena cava</td> <td>deoxygenated ;</td> </tr> <tr> <td>C</td> <td>pulmonary vein</td> <td>oxygenated ;</td> </tr> <tr> <td>D</td> <td>aorta</td> <td>oxygenated ;</td> </tr> <tr> <td>E</td> <td>femoral artery</td> <td>oxygenated ;</td> </tr> </tbody> </table>	blood vessel	name of blood vessel	oxygenated / deoxygenated	A	hepatic portal vein	deoxygenated ;	B	(inferior) vena cava	deoxygenated ;	C	pulmonary vein	oxygenated ;	D	aorta	oxygenated ;	E	femoral artery	oxygenated ;	4	
blood vessel	name of blood vessel	oxygenated / deoxygenated																			
A	hepatic portal vein	deoxygenated ;																			
B	(inferior) vena cava	deoxygenated ;																			
C	pulmonary vein	oxygenated ;																			
D	aorta	oxygenated ;																			
E	femoral artery	oxygenated ;																			
(b)(i)	chemical / substance, made by a gland ; travels in the blood (plasma) ; alters the activity of one or more specific target organs ;	2	I proteins R enzymes A alters activity of / affects, target organ(s) A controls																		
(b)(ii)	1 controls blood, glucose / sugar, concentration / level ; 2 increased, uptake / respiration, of glucose ; 3 (stimulates cells to) convert glucose to <u>glycogen</u> ; 4 <i>idea that</i> target organs are, muscle / liver ; 5 (so) decreases blood glucose concentration ; 6 ref to, negative feedback / homeostasis ;	3																			
(c)	1 shunt vessels, constrict / close / AW ; 2 less blood flow through shunt vessels ; 3 arterioles, widen / dilate / relax ; 4 <u>vasodilation</u> (in context of arteries and arterioles) ; 5 more blood flow (through capillaries) near the surface of the skin / AW ; 6 (more) heat loss from blood (by radiation) ;	3	R if in context of capillaries / veins A 'blood vessels'																		

14. 0610_w17_MS_43 Q: 6

Answer		Mark	Partial Marks
(a)(ii)	sweat glands ; blood vessels ; hair erector muscles ;	1	
(a)(iii)	<u>negative feedback</u> ;	1	
(b)(i)	shunt vessels, constrict / close / AW ; more / redirect, blood flow to skin (capillaries) ; heat from blood, lost / radiates ; vasodilation (of arterioles) ;	3	A vasoconstriction A heat loss from blood vessels
(b)(ii)	sweat, secreted / made (by sweat glands) ; evaporative (cooling) ; hair erector muscles relax ; (hairs lie flat) so that less (air) insulation / allows more air movement (across skin) ;	3	A less air trapped
(c)(i)	quick(er) (response) ; long-term response is not required ;	1	
(c)(ii)	insulin ; <u>glucagon</u> ; ADH ; AVP ;	2	

15. 0610_p16_MS_40 Q: 2

(a) Any three from:

muscular contraction / movement / pump blood;

allow: maintain posture

maintenance of body temperature;

active transport described / example such as nerve impulses;

metabolic reactions / named example (e.g. excretion / biosynthesis / digestion);

mitosis / nuclear division / cell division;

growth / replacement / repair;

making gametes / owtte;

avp;

[max 3]

(b) (i) respiration;

[1]

(ii) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

[1]

(c) Any four from:

takes time for;

oxygen debt (to be repaid);

more oxygen needed;

lactic acid / lactate;

builds up in muscles / needs to be cleared away;

lactic acid is broken down / respired;

[max 4]

(d) Any five from:

as body temperature increases;

vasodilation;

(relaxation / owtte) of arterioles;

allow: arteries

increase in supply of blood to skin capillaries;

(causes) loss of heat;

by, conduction / convection / radiation;

increase in blood flow to sweat glands;

increased production of sweat;

loss of heat by evaporation;

[max 5]

16. 0610_s16_MS_42 Q: 6

	Answer	Mark	Partial Marks
(a)	homeostasis / negative feedback ;	[1]	
(b) (i)	insulin ;	[1]	
(ii)	liver / muscle / pancreas ;	[1]	
(iii)	glycogen ;	[1]	
(c)	<p><i>Symptoms:</i> fatigue / AW ; thirst / AW ; increased urination / glucose in urine / fruity breath / ketosis / flushed face ; weight loss / nausea / vomiting / abdominal pain / hunger ; blurred vision / glaucoma ; behavioural changes / confusion / faint / unconscious / coma(tose) / dizzy / rapid breathing / deep breathing ; slow (wound) healing / poor circulation ;</p> <p><i>Treatment:</i> insulin ; by injection / insulin pump ; regular blood glucose tests ; regular meals / controlled diet ;</p>	[max 5]	<p>max 3 from either section A weakness I death</p> <p>A meal plan / healthy eating / monitoring carbohydrates / avoid sugary foods, drinks and fruit juices / eat complex carbohydrates / intake of sugar if blood sugar concentration is too low</p>
		[Total: 9]	

17. 0610_m18_MS_42 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	<p><i>advantages</i> 1 lower (dry) mass ; 2 fewer weeds / lower weed density ; 3 less competition ; 4 therefore higher yield of crop ;</p> <p><i>disadvantages</i> 5 more treatments ; 6 higher cost / time / effort ; 7 idea of increased environmental impact ; 8 increased health risks ;</p>	4	
(a)(ii)	<p>increased strength of wind ; increased precipitation ; resistance ; type of weed ; AVP ;; e.g. ref. to amount / too much time between treatments</p>	2	
(a)(iii)	<p>1 absorbed by (broad leaved) weeds / selective for weeds ; 2 less absorption by (narrow leaved) crops ; 3 increase the growth (rate) of weeds ; 4 plant cannot produce enough, glucose / photosynthesis fast enough ; 5 weeds cannot maintain rate of growth ; 6 AVP ; e.g. falls over and can't absorb sunlight</p>	3	
(b)	<p>gravi / geo ; tropism ;</p>	2	

18. 0610_s18_MS_43 Q: 4

	Answer	Mark	Partial Marks										
(a)(i)	chemical / substance, produced by a gland ; transported in the blood (plasma) ; alters the activity of one of more specific target, organs / tissues / cells ;	2											
(b)(i)	retina ;	1											
(b)(ii)	fovea ;	1											
(b)(iii)	sensory (neurone / nerve cell) ;	1											
(b)(iv)	optic ;	1											
(b)(v)	spinal cord ;	1											
(b)(vi)	adrenal (gland) ;	1											
(c)	<table border="1"> <thead> <tr> <th>organ</th> <th>effect of the hormone</th> </tr> </thead> <tbody> <tr> <td>heart</td> <td>increased, pulse / heart, rate / beat ;</td> </tr> <tr> <td>liver</td> <td>conversion of glycogen to glucose / increased blood glucose (concentration) ;</td> </tr> <tr> <td>lungs</td> <td>increase, (rate) / depth, of breathing ;</td> </tr> <tr> <td>eyes</td> <td>dilated pupils / radial muscles (in iris) contract ;</td> </tr> </tbody> </table>	organ	effect of the hormone	heart	increased, pulse / heart, rate / beat ;	liver	conversion of glycogen to glucose / increased blood glucose (concentration) ;	lungs	increase, (rate) / depth, of breathing ;	eyes	dilated pupils / radial muscles (in iris) contract ;	4	
organ	effect of the hormone												
heart	increased, pulse / heart, rate / beat ;												
liver	conversion of glycogen to glucose / increased blood glucose (concentration) ;												
lungs	increase, (rate) / depth, of breathing ;												
eyes	dilated pupils / radial muscles (in iris) contract ;												
(d)	nervous system, responds quickly / immediately ; ora <i>idea that</i> (nerve) impulses travel to, (specific) muscles / (adrenal) glands / effector(s) ; effects of endocrine system are long lasting ; ora hormones / adrenaline, travels throughout the body / allows multiple (target) organs to respond (to same signal) ; <i>idea that</i> less energy required than to have nerves going to every, cell / tissue ; stimulate both voluntary and involuntary responses (simultaneously) ; more effective / enhanced, response (than using one system alone) ;	4											
(e)(i)	auxin ;	1											
(e)(ii)	2,4-D is a weedkiller / AW ; sprayed on crops / applied to leaves ; specific to broadleaved weeds ; does not affect, cereals / narrow-leaved crop plants ; causes uncontrolled growth ;	2											

	Answer	Mark	Partial Marks
(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]	
(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 or sense light / ref to turgor pressure	[max 4]	I 'found, in / on' A 'dark / shaded, side' I comments about roots
		[Total: 16]	

20. 0610_s16_MS_43 Q: 2

	Answer	Mark	Partial Marks
(a) (i)	retina ;	[1]	
(ii)	optic (nerve) ;	[1]	I sensory neurone
(iii)	(light is) refracted ;	[1]	A description of refraction
(iv)	sensitive to /detect, light ; in low intensity / night ; pass impulse to, <u>sensory</u> neurone / optic nerve ; AVP ;	[max 2]	sensitive in dim light = 2 marks A provides night vision
(b) (i)	gravity ;	[1]	
(ii)	negative /away from (gravity) ; (gravi)tropism / (geo)tropism ;	[2]	
(iii)	<i>upwards</i> grow towards (where) light (should be) ; more, light absorbed / photosynthesis ; more growth ; flowers more likely to attract, insects / pollinators ; more likely to, release / shed / disperse, seeds ; <i>downwards</i> better, anchorage / AW ; absorb, water / mineral ions ; AVP ; ref to competition / damage	[max 2]	
(iv)	auxins <u>made</u> in shoot tip ; (auxin) spread / move / diffuse ; <i>idea</i> of unequal distribution of auxin ; auxins collect, in <u>lower</u> side of stem ; auxin stimulates (cell) elongation (where it accumulates) ; AVP ;	[max 4]	I found in tip I growth e.g. (by) absorption of water (by osmosis) / ref to turgor pressure (and) stretching of cell walls / statoliths / detect gravity
		[Total: 14]	