

- 1 (a) temperature / heat / cold ;
pressure ;
pain / sharpness ;
texture / touch ; [max 2]
- (b) ganglion ;
grey matter (of spinal cord) ; [2]
- (c) (i) electrical ;
A electrochemical / movement of ions / electric current
R electrons / electricity [1]
- (ii) myelin / (fatty) sheath ; [1]
- (iii) *award two marks if correct answer with units is given
if not, award one mark if*
- *correct answer with no units*
 - *incorrect answer with correct units*
 - *no answer but correct working*
 - *incorrect answer but correct working*
- 1.5 / 0.02 ;
75, metres per second or m/s or m s^{-1} or m sec^{-1} ; [2]
- (iv) synapse(s) / gap(s) (between neurones) ; [1]
- (d) (i) (V / biceps) contracts ;
arm / elbow, flexes / bends / pulls away from stimulus / AW ; [2]
- (ii) *allow ecf from (i)
if muscle not identified assume it is V*
- triceps (muscle) / (muscle) W / antagonistic muscle / opposing muscle, contracts ;
muscle V relaxes / passive stretching of V ;
A ref to W as antagonistic if already said it contracts
R 'V relaxes that causes contraction of W' [2]

[Total: 13]

- 2 (a) (voluntary)
 ref. to going into room ;
 ref. to switching on light ;
 ref. to grabbing door handle ;
- (involuntary)
 pupils changed size ;
 heart beat speeded up ;
 ref. to sneezing ; [max. 4]
- (b) (i) muscle ; [2]
gland ;
- (ii) motor / efferent (neurone) ; [1]
- (c) (i) phototropism ; (ignore refs. to positive or negative) [1]
- (ii) paint auxin on one side of shoot (or description of other suitable treatment) ;
 place shoot in a dark place AW ;
 leave + for stated period of time (e.g. 1 to 3 days) / until the shoot
 to grows vertically / changes direction AW ;
 ref. to control without auxin ;
 ref. to repeats used ; [max. 4]
- (iii) auxin accumulates on or moves to + shaded side of shoot / auxin is broken down by light ;
 difference in concentrations on shaded side and light side ;
 cells with higher concentration of auxin absorb more water ;
 causes unequal growth ; [max. 3]
- (d) i. ref. to large concentrations used ;
 ii. plants / leaves / stems + are stimulated to grow rapidly ;
 iii. growth gets out of control ;
 iv. root growth inhibited by high concentrations of auxin ;
 v. so plants die ; (linked to ii, iii or iv) ;
 vi. ref. to only broad leaved plants affected AW ; [max. 2]
- [max. 17]**

- 3 (a) a chemical messenger AW;
secreted by an endocrine gland ;
ref. to transport in blood ;
ref. to affecting a target organ ; [max. 2]
- (b) ref. to blood sugar level being high ;
(insulin) secreted by pancreas ;
passes in blood stream + to liver ;
stimulates liver to absorb glucose ;
converts glucose to glycogen ;
ref. to increased respiration by liver to reduce blood sugar levels ; [max. 4]
- (c) ref. to being digested / broken down ;
by protease / pepsin ; [2]
- (d) CORRECT ORDER AND NAMES NEEDED FOR THREE MARKS
TWO MARKS FOR CORRECT NAMES IN WRONG ORDER
ONE MARK FOR TWO CORRECT NAMES
- trachea / windpipe → ronchus → bronchiole [3]
- (ii) diffusion ;
active uptake / active transport ; [max. 1]
- (iii) thin walls / walls one cell thick ; ® refs. to cell walls
large surface area ;
large numbers of alveoli ;
closely associated with + capillaries / blood stream ;
moist lining ;
ref. to presence of mitochondria ; [max. 3]
- [max. 15]**