



# **GCSE Biology**

## **The Human Nervous System**

### **Mark Scheme**

**Time available: 55 minutes**

**Marks available: 49 marks**

**[www.accesstuition.com](http://www.accesstuition.com)**

## Mark schemes

<b>1.</b>	(a) releasing saliva when food enters the mouth	1
	withdrawing the hand from a sharp object	1
	(b) bright light	
	<i>allow described method of increasing light</i>	
	<i>ignore light unqualified</i>	
	<i>allow correctly named drug e.g. morphine / heroin</i>	1
	(c) iris	1
	(d) muscle contraction	
	<i>allow muscles shorten</i>	
	<i>ignore radial / circular</i>	
	<i>ignore muscles relax / constrict</i>	
	<i>do <b>not</b> accept muscles expand</i>	
	<i>do <b>not</b> accept ciliary muscle contracts</i>	1
	(e) <b>Level 2:</b> Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4-6
	<b>Level 1:</b> Facts, events or processes are identified and simply stated but their relevance is not clear.	1-3
	<b>No relevant content</b>	0

**Indicative content**

- receptor detects stimulus
- e.g. receptor detects pressure
- receptor generates impulses / electrical signals
  
- neurones conduct impulses / electrical signals
- neurone A conducts impulses to spinal cord
- neurone A = sensory neurone
- synapse between neurones
- chemical (/ neurotransmitter) crosses synapse
- chemical stimulates impulse(s) in neurone B
- neurone B = relay neurone
- neurone C = motor neurone
  
- effector carries out response
- e.g. muscles of the arm / leg contract
- muscles contract **or** gland secretes chemicals

to access **level 2**, candidates need to consider, in terms of the indicative content, the receptor, the neurones and the effector in the correct sequence

[11]

- |           |     |  |   |
|-----------|-----|--|---|
| <b>2.</b> | (a) | any <b>two</b> from:   |   |
|           |     | <ul style="list-style-type: none"> <li>• drop the ruler from the same height</li> <li>• use the same / dominant hand each time</li> <li>• thumb same distance from ruler at the start</li> <li>• use same type / weight of ruler</li> <li>• drop the ruler without any force each time</li> <li>• keep arm resting on the edge of the table</li> </ul> | 2 |
|           | (b) | 8  |   |
|           |     | <i>allow 8.0</i>   | 1 |
|           | (c) | 2 (in test number 2)   | 1 |
|           | (d) | 12   | 1 |
|           | (e) | $(12 + 13 + 13 + 9 + 8 / 5 =) 11$  | 1 |
|           | (f) | 0.15 – 0.12 (s)  | 1 |
|           |     | 0.03 (s)   |   |
|           |     | <i>allow 0.03 (s) with no working shown for 2 marks</i>  | 1 |
|           | (g) | carry out more repeats   | 1 |

- (h) caffeine speeds up reflex actions  
**or**  
reduces reaction time

3.

- (a) receptors detect / sense stimuli / change in surroundings **or** convert stimulus into an impulse

*ignore send impulses to brain / spinal cord*

1

example of a receptor

*allow any appropriate organ or part of an organ, eg eye / retina or  
named type of receptor eg light receptor*

1

effectors allow / make response **or** convert an impulse to an action

*ignore receive impulses from brain / spinal cord*

1

(effector) muscle / gland

*allow an example*

*ignore eg arm / leg*

1

- (b) (i) junction

*allow idea of a (small) gap / space*

*do **not** allow if implication is that the neurones move*

1

between neuron(e)s

*allow named types of neurones*

1

- (ii) chemical

*allow answers in terms of specific types of neurone*

*allow neurotransmitter / named neurotransmitter released*

1

any **one** from:

- (chemical released) from one neurone  
*ignore produced*
- (chemical) passes (across synapse) to next neurone to stimulate / cause (electrical) impulse  
*allow diffuses for passes (across)*

1

- (c) (i) skin

*ignore hand / leg*

1

(ii) 1.6 (cm per millisecond)  
*allow 2 if evidence of rounding up of 1.6*

1

(iii) any **two** from:  
*ignore length of neurones*

- synapses slow down transmission / impulse  
*allow idea of movement of chemical being slower than electrical impulse*
- fewer synapses (via brain)  
*allow one synapse compared to two **or** only one synapse*
- (therefore) fewer delays  
*allow impulse travels more slowly in relay neurones*

2

[12]

**4.**

(a) (i) stimulus

1

(ii) cytoplasm

1

(b) (i) ear(s)

*in this order only*

1

eye(s)

*accept retina*

1

skin

*ignore extra detail*

1

(ii) A muscle

1

[6]

**5.**

(a) (i) sensory neurone

1

a synapse

1

(ii) contract

1

(iii) not connected to brain / coordinated only by spinal cord

1

- (iv) automatic / rapid (response)  
*allow no thinking / faster / less time*

1

protects body from danger / from damage / from burning

1

- (b) (i) caffeine decreases reaction time  
*accept caffeine speeds up / quicker reactions*

1

- (ii) the two sets of results overlap (considerably)  
*allow use of appropriate numbers – eg 5 of the ‘after’ results overlap with the ‘before’ results*  
*allow ‘wide spread of results’*  
*allow ‘it was just one person’ or ‘it was a small sample’*  
*accept use of one pair of results only – if meaning is clear*  
*accept use of one pair of overlapping results*

1

- (iii) any **two** sensible suggestions: eg

- more repetitions
- perform investigation on several other people
- use other (measured) amounts of coffee
- use different / more time intervals
- other suggested measure of reaction time – eg computer-generated light flash + time measurement
- use pure caffeine or caffeine tablets

2

[10]