

Mark schemes

1.

- (a) releasing saliva when food enters the mouth

1

withdrawing the hand from a sharp object

1

- (b) bright light

allow described method of increasing light

ignore light unqualified

allow correctly named drug e.g. morphine / heroin

1

- (c) iris

1

- (d) muscle contraction

allow muscles shorten

ignore radial / circular

ignore muscles relax / constrict

*do **not** accept muscles expand*

*do **not** accept ciliary muscle contracts*

1

- (e) **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

4–6

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1–3

No relevant content

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]

2.

(a) any **two** from:

- drop the ruler from the same height
- use the same / dominant hand each time
- thumb same distance from ruler at the start
- use same type / weight of ruler
- drop the ruler without any force each time
- keep arm resting on the edge of the table

2

(b) 8

allow 8.0

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)

allow 0.03 (s) with no working shown for 2 marks

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]