

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

MARK SCHEME

B5

HOMEOSTASIS & RESPONSE

TEST 3

Mark schemes

1	(a) (i) B	1
	(ii) D	1
	(iii) C	1
	(b) (i) insulin	1
	(ii) pancreas	1
		[5]
2	(a) sensory neurone	1
	(b) (i) synapse	1
	(ii) a chemical	1
	(c) (What happens to the muscle) <i>mark both parts of the question together</i>	
	any one from: <ul style="list-style-type: none">contraction / contracts <i>ignore relaxation / relaxes / tenses</i>gets shorter (How this helps the body) idea of protection for body (from damage / pain) <i>eg moves finger / arm away (from pin / stimulus / source of pain)</i>	1
		[5]
3	(a) (i) sensory neurone	1
	a synapse	1
	(ii) contract	1
	(iii) not connected to brain / coordinated <u>only</u> 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]

4 (a) (i) follicle stimulating hormone / FSH 1

(ii) oestrogen 1

(b) (i) any **one** from:

- to help them have a baby / get pregnant
ignore to make them fertile
- to stimulate egg production / release / maturation
- own levels of FSH / LH / hormone (too) low
allow to increase hormone / FSH / LH levels
do not allow to increase oestrogen levels

1

(ii) through the bloodstream 1

(c) oestrogen 1
progesterone 1

[6]

5

(a) any **one** from:
• temperature
• water
allow ions / salt / pH
allow oxygen / carbon dioxide 1

(b) 7 (mmol/dm³)
allow 6.75 to 7.25 (mmol/dm³) 1

(c) 1 (pm)
allow 12.30 to 1.10 (pm) 1

(d) insulin 1

(e) glucose moved from blood into (liver / muscle) cells
allow insulin transported in the blood and glucose moved into (liver / muscle) cells 1

to be stored as glycogen
allow to be converted into glycogen 1

(f) the person injected too much hormone 1

(g) decrease 1

(because) glucose is used in respiration
allow increase only if linked to glucagon released for 2 marks 1

(h) (blood glucose concentration would) not increase as much
allow (blood glucose concentration would) return to normal faster 1

[10]

6

- (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]

7

(a) $0.92 = 76.2 \times \text{time}$

1

$\text{time} = 0.92 \div 76.2$

1

$= 0.012$

allow 0.012 with no working shown for 3 marks

1

(b) pathway **B** has two synapses

allow converse for pathway A

1

chemicals diffuse across each synapse

1

which slows down the impulse

1

(c) 140–203

1

- (d) use the same person for each test 1
- use left hand **and** right hand 1
- use a bigger sample size **or** more people
allow take more readings with each person 1
- (e) mean drop distance = $(230 + 211 + 279 + 215 + 264) \div 5 = 239.8$ 1
- 239.8 mm = 0.2398 m 1
- mean reaction time = $\sqrt{\frac{2 \times 0.2398}{9.8}}$ 1
- = 0.221 1
- incorrect sig. figs max. 3 marks* 1
- allow 0.221 with no working shown for 4 marks* 1

[14]

- 8** (a) maintains the lining of the uterus 1
- suppresses FSH 1
- (b) (sudden) drop in progesterone 1
- causes the lining of the uterus to break away 1
- (c) FSH (injections) stimulate the growth / maturation of eggs (to be fertilised) 1
- FSH stimulates oestrogen release 1
- (which) stimulates uterus lining to develop (for the fertilised egg to implant into)
allow oestrogen stimulates LH production / release 1
- LH stimulates ovulation / egg release 1

[8]

- 9** (a) immune system 1
- allow white blood cells / lymphocytes*
ignore phagocytes

produces antibodies

1

(which) attack the antigens on the transplanted organ / pancreas

*allow transplanted organs have foreign antigens at start of explanation **and** linked to attacking the organ*

1

(b) (i) change / rise detected by the sensor

1

information used to calculate how much insulin she is going to need (bring her blood glucose back to normal)

1

(pump delivers) insulin into the blood

1

(causing) glucose to move into cells

allow (liver) converts glucose to glycogen

1

max 2 if no ref. to artificial pancreas

(ii) any **one** from:

- it is more accurate **or** less chance of human error
- (glucose) level will remain more stable **or** no big rises and falls in blood sugar levels
- you don't forget to test and / or inject insulin
- if ill or in coma insulin is still injected

ignore continuous and automatic unqualified

1

[8]

10

(a) motor

allow efferent / postsynaptic

*allow **another** relay (neurone)*

1

(b) release of chemical (from relay neurone)

allow ecf for 'motor' neurone from (a)

allow release of neurotransmitter / named example

1

chemical crosses gap / junction / synapse

allow diffuses across

allow chemical moves to X

1

chemical attaches to X / motor / next neurone (causing impulse)

1

(c) (curare) decrease / no contraction

accept (muscle) relaxes

1

(strychnine) increase / more contraction

*if no other mark awarded allow 1 mark for (curare) decrease / no response **and** (strychnine) increase / more response*

1

[6]