

MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 5 - TEST 4

HOMEOSTASIS AND RESPONSE

Intermediate

Mark schemes

1.

(a) Y - spinal cord / central nervous system / CNS

*do **not** accept spine*

ignore nerve / nervous system / coordinator

ignore grey / white matter

1

W - receptor / nerve ending

ignore sensory / neurone / stimulus

1

X - effector / muscle

allow gland

1

(b) any **two** from: eg

accept reverse argument for each marking point

- reflex action quicker
- effect of reflex action over shorter period
- hormone involves blood system and reflex involves neurones / nerve cells
ignore nervous system / nerves
- reflex involves impulses and hormone involves chemicals
- reflex action affects only one part of the body
ignore involves brain
ignore outside / inside stimuli

2

[5]

2.

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

- chemical messenger / message
allow substance / material which is a messenger
- chemical / substance produced by a gland
allow material produced by a gland
- chemical / substance transported to / acting on a target organ
- chemical / substance that controls body functions

1

(ii) gland / named endocrine gland

brain alone is insufficient

allow phonetic spelling

1

(iii) in blood / plasma **or** circulatory system **or** bloodstream

accept blood vessels / named

*do **not** accept blood cells / named*

1

(b) *each hormone must be linked to correct action*

apply list principle

ignore the gland producing hormone

FSH stimulates oestrogen (production) / egg maturation / egg ripening

ignore production / development of egg

1

oestrogen inhibits FSH

allow oestrogen stimulates LH / build up of uterine lining

1

LH stimulates egg / ovum release / ovulation

accept LH inhibits oestrogen

accept LH controls / stimulates

growth of corpus luteum

ignore production of egg

1

[6]

3.

(a) (i) endocrine glands **or** endocrine system

allow a specific named gland

1

(ii) (dissolved) in the blood(stream) **or** plasma

1

(b) (i) pancreas **or** islets of Langerhans

1

(ii) (it **or** insulin) lowers blood sugar level [1]

(by) (speeding up **or** increasing)

conversion of glucose to glycogen [1]

in the liver [1]

(and) speeding up **or** increasing uptake of glucose by body cells [1]

4

[7]

4.

(a) fast reaction to reduce / protect from harm

allow named examples

1

(b) higher caffeine concentration causes shorter reaction time.

allow converse

ignore 'faster / slower reaction time'

1

(c) **Level 3 (5–6 marks):**

A coherent method is described with relevant detail, which demonstrates a broad understanding of the relevant scientific techniques and procedures. The steps in the method are logically ordered. The method would lead to the collection of valid results.

Level 2 (3–4 marks):

The bulk of a method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant techniques and procedures. The method may not be in a completely logical sequence and may be missing some detail.

Level 1 (1–2 marks):

Discrete relevant points are made which demonstrate some understanding of the relevant scientific techniques and procedures. They may lack a logical structure and would not lead to the production of valid results.

0 marks:

No relevant content.

Indicative content

- use decaffeinated coffee as control
- control volume of coffee
- blind trial or do not tell students which coffee they are drinking
- left for standard time between drink and test
- at least 10 minutes
- control start position of ruler
- control other factors such as light in the room
- same person for different concentrations
- repeat for each caffeine concentration
- use a range of caffeine concentrations
- start with lowest concentration of caffeine
- use caffeine solution instead of coffee to control for other ingredients
- repeat investigation with more people and calculate means

6

[8]

5.

(a) (i) chemical

1

(ii) pituitary gland

1

(b) 8

allow 9 or 10

1

- (c) (i) any **four** from:
- progesterone starts being produced at 4 weeks / no progesterone before 4 weeks
 - and then / from 4 weeks increases
 - oestrogen at constant / low level (from 0) to 20 weeks
 - and then / from 20 weeks increases
 - from 20 – 36 weeks level of O rises more steeply than that of P
- or**
- P is always higher than O from 6 to 36 weeks
- if no other marks awarded, allow progesterone and oestrogen both increase / rise for 1 mark.*

4

- (ii) oxytocin

1

level of oxytocin increases just before birth

1

[9]

6.

- (a) (i) **A** – pituitary
allow hypothalamus

1

B – ovary / ovaries

1

- (ii) in blood (stream)
accept in plasma
ignore dissolved

1

- (b) (i) FSH and Luteinising Hormone (LH)

1

- (ii) fertilised
OR
reference to sperm

1

form embryos / ball of cells or cell division

1

(embryo) inserted into mother's womb / uterus

allow (fertilised egg) is inserted into mother's womb / uterus

1

(iii) any **one** from:

- multiple births lead to low birth weight
- multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages
allow premature
ignore reference to cost / ethics / population

1

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

- almost identical
allow S (slightly) more successful
- both approximately 20%

1

(ii) larger numbers (in clinic R) (in 2007)

allow only 98 (in S) (compared to 1004 (in R))

1

results likely to be more repeatable (in 2008)

allow more reliable

*do **not** accept more reproducible / accurate / precise*

1

[11]

7.

(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]
8. (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

$$239.8 \text{ mm} = 0.2398 \text{ m}$$

1

$$\text{mean reaction time} = \sqrt{\frac{2 \times 0.2398}{9.8}}$$

1

$$= 0.221$$

incorrect sig. figs max. 3 marks

1

allow 0.221 with no working shown for 4 marks

[14]