

# MARK SCHEME

# GCSE

## BIOLOGY

## AQA - COMBINED SCIENCE

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B 5 - TEST 6

HOMEOSTASIS AND RESPONSE

Advanced

## Mark schemes

1.

- (a) X – relay (neurone)  
Y – motor (neurone)

*both required for mark  
must be in correct order*

1

- (b) chemical (released from X)

*do **not** accept electrical impulse  
accept chemical messenger / transmitter  
accept neurotransmitter  
accept named transmitter substance eg acetylcholine*

1

(crosses) synapse

*allow for 2 marks diffusion of the chemical across the synapse*

1

[3]

2.

oestrogen produced

*gains 1 mark*

**but** N.B. sequence important here  
oestrogen produced by ovary

*gains 2 marks*

LH produced

*gains 1 mark*

**but**

LH produced by pituitary

*gains 2 marks*

LH causes egg release

*for 1 mark*

[4]

3.

- (a) (i) synapse

1

- (ii) chemical

*accept neurotransmitter or named neurotransmitter*

1

- (b) 3.175 **or** 3.18 (seconds)  
*allow 2 marks for a time of 3.2 calculated for the pain impulse*  
**or**  
*allow 1 mark for a correct substitution or reorganisation:*  
 $0.6 = 1.92 / t$   
**or**  
 $t = 1.92 / 0.6$   
*allow 1 mark for an incorrect time for pain impulse – 0.025 correctly subtracted*

3

[5]

4.

- (a) LH or FSH (only one mentioned)  
*gains 1 mark*

**but**

- LH and/or FSH (both mentioned)  
*gains 2 marks*

rises (sharply)  
*for 1 further mark*

3

- (b) FSH or LH level kept low  
 no ovulation/egg not released  
*for 1 mark each*

2

- (c) for:  
 very effective/prescribed/  
 personal preference/convenient/  
 promote family values  
*any two for 1 mark each*

against:  
 upset internal environment  
 named side effects (allow two)  
 religious belief  
 no protection against VD/AIDS  
 long-term effects  
 moral belief  
*any two for 1 mark each*

4

[9]

5.

- (a) (i) reduced sharply  
*for 1 mark*

1

(ii) converted to glucose which is respired to produce energy

*(allow answers in terms of glucagon)*

*gains 3 marks*

3

(b) (i) athlete A's was most effective  
since resulted in highest muscle glycogen level on day of race  
for energy release during race

*for 1 mark each*

3

(ii) e.g. excess carbohydrate stored as glycogen rather than fat in short term  
particularly if glycogen stores depleted

*for 1 mark each*

2

**[9]**

**6.**

(a) receptors

*for 1 mark*

1

(b) electrical/nerve  
signals/impulses

*for 1 mark each*

2

(c) muscle

*for 1 mark*

1

(d) correct description of:  
stimulus  
receptor  
co-ordinator  
effector  
response

*for 1 mark each*

5

**[9]**

**7.**

(a)  $(715.1 - 238.8 = 476.3)$

$$\frac{476.3}{715.1} (\times 100)$$

1

66.6 (%)

*allow correct rounding of 66.60606908*

1

*an answer of 66.6 (%) scores 2 marks*

- (b) hold metre rule above hand of person to be tested so the bottom of the ruler is level with the top of the hand

*allow description of any reasonable method that would give results*

1

drop the rule and the other person catches it

1

record / measure the distance where the rule is caught

1

convert the distance into time using a standard (scale) chart **or** calculation

1

*ignore electronic methods*

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

- higher resolution

*allow measured in milliseconds*

- times are too small (for humans) to measure

*ignore human error unqualified*

- random

*allow not biased*

- no calculation errors

*allow it is quicker*

*ignore more precise*

1

- (d) any **two** from:

- used a different person in each test

**or**

different people need different amounts of sleep

**or**

no baseline established (for comparison)

- only one person was tested for each sleep time

**or**

sample size is too small

- only did the test on one night

- as reaction times in ms they need to do (more than three / five) repeats

**or**

there is wide variation in the results

**or**

result for Student C **or**

4 hours' sleep shows a decrease in reaction time

- don't know if other factors were controlled

*allow correct named example, such as caffeine*

*consumed, sleep before investigation, age*

- table only shows some of the data

2

(e) **reasons in support:**

- performance / accuracy decreases with increasing alcohol concentration  
**and**  
performance / accuracy decreases as lack of sleep increases
- reduction in performance at the legal alcohol limit / 0.08% (for driving) is the same as (more than) 24 hours without sleep

**reasons against:**

- idea that the statement is sensationalised and does not use (quantifiable) data
- the (performance) scales are different, so difficult to make comparison  
**or** the (performance) scales are different so the data is misleading
- being tired is subjective / different for everyone  
*allow idea that lack of sleep does not necessarily correlate with tiredness*
- there is wide variation in the data
- (the graph shows that) some people have 16 / 18 hours without sleep and don't have a drop in performance
- at alcohol levels of 0.09% some people have a 14% drop in performance (which is much higher than lack of sleep)  
*allow other correct points of comparison*
- (data contradicts the statement because) for some a small amount of alcohol improves performance  
*max 3 marks if only reasons in support or reasons against given*  
*ignore study design*

4

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8.

(a) scales drawn

*should use more than 50% of the graph paper*

1

all five points plotted

*allow  $\pm 0.5$  small square tolerance*

*allow 1 mark for 3 or 4 points plotted accurately*

2

line of best fit drawn

1

(b) the higher the concentration of glucose the darker the blue compound that is formed

1

the blue compound absorbs the light

1

(c) 0.13

*allow 0.12*

*allow ecf from graph drawn in part (a)*

1

- (d) increase in blood glucose detected by the pancreas 1
- insulin is released from the pancreas 1
- glucose would move into cells 1
- glucose converted to glycogen (for storage) in the liver 1
- (e) glycogen isn't converted to glucose 1
- therefore more glucose isn't released into the bloodstream 1
- (f) pancreas  
**or**  
 bone marrow  
*do **not** accept embryo*  
*allow other correct sources of stem cells* 1
- (g) any **three** from:  
 • would not need to inject insulin  
 • continuous control  
 • would not need to test blood glucose levels (via blood tests)  
 • won't need to monitor carbohydrate intake  
 • no risk of forgetting to inject insulin 3
- (h) any **two** from:  
 • fear that the cells could become cancerous  
 • possible transmission of other disease  
 • may form other types of cell 2

**[19]**