

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

MARK SCHEME

B5

HOMEOSTASIS & RESPONSE

TEST 1

Mark schemes

1	(a) pancreas	1
	(b) (in the) blood(stream) <i>allow in the (blood) plasma</i> <i>ignore dissolved or in solution</i>	1
	(c) any two from: <ul style="list-style-type: none">• concentration rises and falls in both people• concentration is higher at start / always in person with diabetes• concentration rises higher in person with diabetes <i>allow correct use of figures</i>	2
	plus any two from: <ul style="list-style-type: none">• concentration rises more rapidly in person with diabetes• concentration stays high for longer in person with diabetes• concentration does not return to starting level during test in person with diabetes, yet concentration returns to starting concentration by 90 minutes in person without diabetes• concentration goes below starting concentration only in person without diabetes	2
	(d) reduce carbohydrate / glucose / sugar in diet	1
	(so) blood glucose concentration does not increase as much	1
	(so) there is reduced named effect (of prolonged high blood glucose) <i>allow reduced short or long term consequences such as tiredness</i> or <i>increase urination</i> or <i>thirst</i> <i>or eye / kidney / nerve / heart disease</i>	1
		[9]

2

(a) in the blood(stream)

allow plasma

ignore dissolved or in solution

1

(b) all three plots correct

accept two correct plots for 1 mark

2

suitable line drawn

1

(c) 1 hour

1

(d) 230–185

identification of steepest part of graph and correct readings taken

1

= 45

1

(e) line on graph showing extrapolation for person **B**

correct value read from graph (at 130 mg per 100 cm³)

allow 1 mark for a value of 4.5–5 hours if no extrapolation shown

2

[9]

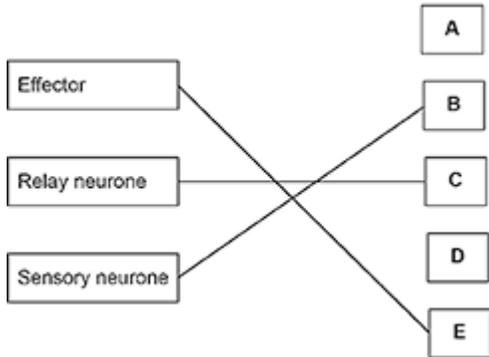
3

(a) Reflex action

1

(b) **Feature**

Label



extra lines from the left negate the mark

3

(c) dependent

1

(d) 17.0

allow answers in range 17.0–17.3 cm

1

- (e) 0.5 cm 1
- (f) 23.5 1
- does not fit the pattern **or** at least 5 cm higher than the other values 1
- (g) The results are for the left and right hands of different people 1
- [10]**

- 4** (a) (i) receptor cells 1
- (ii) eye(s) 1
- accept retina*
- (b) (i) any **one** from: 1
- gender / sex
 - quality of eyesight
eg wearing glasses
 - eg of factor that might affect reaction times
eg alcohol consumption / distractions / tiredness / health / time of day / amount of practice (at this test)
do not allow time / age
- (ii) 182 1
- allow 182.0*
- (iii) Any anomalies can be identified. 1
- (iv) reaction time (too) long **or** reactions (too) slow 1
- allow reaction time (too) slow*
*allow examples of data quoted **or** derived from the table, eg (mean) reaction time for 90 year olds is 162 ms longer than for 75 year olds*
- (so) more likely to have / cause an accident 1
- [7]**

- 5** (a) fast reaction to reduce / protect from harm 1
- allow named examples*

(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]

6

(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

[13]

7

(a) hormone

ignore protein

1

(b) (once a certain amount of thyroxine has been produced)

(thyroxine) inhibits / prevents / stops (pituitary gland from) stimulation of the thyroid gland

1

so less thyroxine is produced

1

(c) cold weather stimulates the pituitary gland, which stimulates the thyroid gland to produce more thyroxine

1

increased / more thyroxine raises basal metabolic rate

1

which increases rate of respiration, which increases body temperature

1

(d) less stimulation of thyroid gland, so less thyroxine produced / released

1

so basal metabolic rate decreases

1

therefore reduced respiration rate, so more food stored as fat

1

[9]

8

(a) **A** FSH

allow follicle stimulating hormone

1

B Progesterone

1

(b) LH peaks

allow luteinising hormone

1

which causes an egg to be released.

1

(c) **Level 3 (5–6 marks):**

A detailed and coherent explanation is given, which logically links the role of different hormones to their use in IVF and a clear explanation of how IVF increases the chance of a successful pregnancy.

Level 2 (3–4 marks):

An attempt is made to link the role of hormones to their use in IVF. The logic used in explaining how IVF increases the chance of a successful pregnancy may not be clear or linked to the hormones.

Level 1 (1–2 marks):

Discrete relevant points made. The logic may be unclear and links may not be made.

0 marks:

No relevant content

Indicative content

Identification of hormones used in IVF:

- FSH
- LH.

Role of hormones in IVF:

- FSH causes eggs to mature
- LH causes the eggs to be released.

Effect on chance of successful pregnancy:

- high levels of hormones cause many eggs to be matured and released
- sperm and eggs are collected and eggs are fertilised (so increased probability of fertilisation)
- fertilised eggs are given time to develop into a small ball of cells
- some are transferred into the mother (uterus), to increase the probability of one successfully implanting.

6

[10]

9

(a) $(76 - 28) \times 2$

1

96 (units / h)

allow 96 (units / h) with no working shown for 2 marks

1

allow 1.6 units / min for 1 mark

allow answer in range of 94–104

(units / h) for 1 mark

(b) increased blood glucose concentration causes insulin release from pancreas

1

which stimulates cells to absorb glucose / sugar from the blood, so blood glucose concentration decreases

1

- (c) any **three** from:
*at least one advantage **and** one disadvantage of the system(s)
 must be given for full marks*
*allow responses phrased in terms of the meter and injection
 systems*

advantages of the new system:

- better control so reduces risk of future health problems
allow fewer low / high blood glucose periods so safer
- no need to estimate dose of insulin
- less chance of giving too much / little insulin
- system works automatically / continuously so no need to test / inject

disadvantages of the new system:

- system is always attached so may restrict activities
allow pump is difficult to hide
- pump has to be carried somewhere
allow risk of discomfort
- pump will need re-filling
- risk of infection
or
 risk of tissue damage (at injection site)
- line might come out
accept new system more expensive

3

qualified conclusion: a statement as to which system is better with reference to at least one advantage and one disadvantage

for example, the new system is better because although it is more expensive, it works automatically

1

- (d) blood glucose concentration goes too low

1

blood glucose concentration detected by pancreas

1

pancreas releases glucagon

1

(glucagon causes) cells to convert to glycogen into glucose

1

glucose released into blood

1

[13]

10

- (a) Pituitary

1

(b) $\frac{10-4}{4}$ or $\frac{6}{4}$

1

= 150 (%)

1

(c) the level in the blood is already higher than it was before point **A**

1

levels hadn't returned to normal yet (before the next scare)

allow he had already been scared so he was expecting the second scare

1

(d) increased oxygen to brain / muscles

1

increased glucose to brain / muscles

1

[7]