

Hormonal Coordination in Humans

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.5 Homeostasis and Response
Sub-Topic	Hormonal Coordination in Humans
Difficulty Level	Gold Level
Booklet	Mark Scheme 1

Time Allowed: 50 minutes

Score: / 48

Percentage: /100

Grade Boundaries:

M1.(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 glycogen into glucose

1

glucose released into blood

1

[13]

M2.(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]

M3.(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]

M4. Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a ‘best-fit’ approach to the marking.

0 marks

No relevant content.

Level 1 (1 – 2 marks)

There is a brief description of kidney function including a mention of pituitary gland **or** hormones but roles may be confused.

Level 2 (3 – 4 marks)

There is a clear description of kidney function in relation to fluctuations in blood water levels and the roles of the pituitary gland **or** hormone is mentioned with correct role.

Level 3 (5 – 6 marks)

There is a clear and detailed scientific description of kidney function in relation to fluctuations in blood water levels and of the roles of the pituitary gland and ADH.

examples of biology points made in the response:

- if water content too low, ADH released
- from pituitary gland
- into the blood
- (causing) kidney reabsorbs more water
- more concentrated / small volume urine produced
- if water content too high, ADH lowered / not produced
- less water reabsorbed by kidney
- more dilute / larger volume urine produced

full marks may be awarded for detailed description of either water loss or gain

[6]

- M5.(a) (i) one form of a / one gene
*do **not** allow 'a type of gene'*
allow a mutation of a gene

1

- (ii) not expressed if dominant / other allele is present / if heterozygous

or

only expressed if dominant allele not present / or no other allele present
allow need two copies to be expressed / not expressed if only one copy / only expressed if homozygous

1

- (b) (i) two parents without PKU produce a child with PKU / **6** and **7** → **10**
allow 'it skips a generation'

1

- (ii) genetic diagram including:
accept alternative symbols if defined

Parental gametes:

6: **N** and **n**
and 7: **N** and **n**

1

derivation of offspring genotypes:

NN **Nn** **Nn** **nn**

allow genotypes correctly derived from student's parental gametes

1

identification: **NN** and **Nn** as non-PKU

OR nn as PKU

allow correct identification of student's offspring genotypes

1

correct probability only: 0.25 / $\frac{1}{4}$ / 1 in 4 / 25% / 1 : 3

*do **not** allow 3 : 1 / 1 : 4*

*do **not** allow if extra incorrect probabilities given*

1

- (c) (i) mitosis
correct spelling only

1

- (ii) 8

1

- (iii) DNA

allow deoxyribonucleic acid

*do **not** allow RNA / ribonucleic acid*

1

- (d) (i) may lead to damage to embryo / may destroy embryos / embryo cannot give consent
allow avoid abortion
allow emotive terms – eg murder religious argument must be qualified
allow ref to miscarriage
allow idea of avoiding prejudice against disabled people

allow idea of not producing designer babies

1

(ii) any **one** from:

- prevent having child with the disorder / prevent future suffering /
reduce incidence of the disease
ignore ref to having a healthy child
ignore ref to selection of gender
- embryo cells could be used in stem cell treatment
allow ref to long term cost of treating a child (with a disorder)
allow ref to time for parents to become prepared

1

[12]