AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.1 HOMEOSTASIS (PACK 4)

SCORE	PERCENTAGE
/33	%

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Q1.

(a) any **one** from:
- temperature
- water

allow ions / salt / pH

allow oxygen / carbon dioxide

1

(b) 7 (mmol/dm^3)

allow 6.75 to 7.25 (mmol/dm^3)

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]

Q2.

(a) any **two** from:

- synthesis of new molecules

allow named molecule eg starch / glycogen / cellulose / lipids / fats / proteins / hormones / antibodies

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- for active transport
- to keep warm (in mammals / birds)

  allow description

  allow to keep warm (in animals)

  allow for movement (in animals)

  allow for transmission of nerve impulses (in animals)

2

(b) mitochondria / mitochondrion

1

(c) both occur without oxygen

1

both release (a small amount of) energy

1

muscle cells produce lactic acid but plant cells produce ethanol

1

muscle cells do **not** produce carbon dioxide but plant cells do

marks can be awarded from correct word or balanced symbol equations

1

(d) the amount of oxygen needed to react with the lactic acid formed

allow the amount of oxygen needed to break down

or *oxidise the lactic acid*

1

[8]

Q38.

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

- age
- gender
- body mass
- number in group / 50

allow number of children

- high body temperature

allow starting temperature

allow dose / amount of drug given

1

(ii) any **one** from:

- tablet that does not contain a drug / anything

allow sugar pill

*do **not** allow a different drug*

- fake drug

1

(b) (i) 38.2 (°C)

1

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(ii) ibuprofen

no mark for drug
no marks if wrong drug selected

any **two** from:

- reduced body temperature fast(er)

allow acts fast(er)

- maintained temperature in normal range / around 37 °C (longer / for several hours)
- paracetamol did not reduce temperature to normal / 37 °C

accept ibuprofen did reduce temperature to normal / 37 °C

- ibuprofen given less frequently

allow less drug needed

ignore cheaper unless qualified

2

[5]

Q39.

(a) (bacteria and viruses produce) toxins

allow poisons
allow damage body cells

1

(b) (i) body mass

allow weight
allow ethnicity

ignore height / size

1

(ii) placebo / fake drug

allow sugar pill

allow no treatment

1

(iii) any **one** from:

- as a control group
- for comparison
- to see if the drugs worked
- to take account of psychological effect

accept placebo effect
allow to avoid bias

1

(c) (i) 1.2 (°C)

1

(ii) 3 (hours)

1

(d) (i) (Paracetamol)

any **two** from:

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- ibuprofen reduces body temperature faster
- ibuprofen reduces temperature more
- ibuprofen doesn't need to be taken as often
- ibuprofen keeps body temperature lower / normal / 37 °C for longer

allow works faster

2

(ii) (Paracetamol + ibuprofen)

any **two** from:

- body temperature decreases at a similar rate

allow ibuprofen works (almost) as fast

- ibuprofen maintained body temperature close to normal / 37 °C

allow ibuprofen maintained normal body temperature almost as long

allow doesn't make temperature drop below normal as long

- (better to) take fewer drugs

allow less chance of overdose / giving too much

allow (better to) take drugs less frequently

- easier to administer

allow less chance of missing doses / taking at the wrong time

2

[10]

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Q1.

(a) 75% of students could not give an example of an internal condition controlled by homeostasis. Many repeated the example given in the stem of the question.

(b) This question was answered well with 60% of students achieving credit. There were instances of students reading from the scale of the graph incorrectly.

(c) 45% of students could interpret the graph to suggest at what time the person ate lunch.

(d) 52% of students could identify the hormone injected by the person with diabetes as insulin. A variety of reproductive hormones were incorrectly stated for this question.

(e) Students found this very difficult with 10% answering correctly. Most students gave incorrect statements regarding insulin, glucose and glycogen. Many referred to glucagon in incorrect contexts.

(f) 51% of students could apply their knowledge to the graph to suggest the person injected too much hormone.

(g) Many students stated that blood glucose concentration would increase during a run. This was allowed if it was linked to glucagon release. Few students made that link. Many students stated that exercise gives us energy, so glucose increases, highlighting several misconceptions. The usual misconceptions of glucose making or producing energy were also seen. 54% of students achieved any credit for this question.

(h) 26% of students suggested how the graph would differ for a person who does not have diabetes.

Q38.

(a) (i) Students answered this question well, stating the number of children, amount of drug, age or body mass as control variables. The most common incorrect response was the type of drug given, which was the independent variable.

(ii) Fake drug and sugar pill were the most common correct responses. Some students did not answer the question asked, but instead described a double-blind trial. Common incorrect answers included a vaccine, or a small or very weak dose of the drug.

(b) (i) Just over half of the students gained the mark here. 37.0 (°C) was a very common incorrect response. Students were unable to use the key, so gave the answer for ibuprofen rather than for paracetamol.

(ii) Most students selected ibuprofen as being the drug of choice, but many struggled to explain why they had selected it. A lot of students identified that ibuprofen reduced body temperature faster, or that it did reduce body temperature to normal whereas paracetamol did not. The mark scheme was fairly generous and, although a comparison was not essential, students who did phrase their responses giving comparisons gave clearer answers which were more likely to gain marks. Several students quoted temperatures, but did

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not go on to state an advantage of ibuprofen. Unqualified responses such as ibuprofen is cheaper or more effective were insufficient.

Q39.

(a) Only just over a third of the students knew that bacteria and viruses make us feel ill because they produce toxins. Many students said that bacteria produce toxins, but went on to give a different reason for viruses, for example, viruses reproduce inside cells or make the cells burst. These students gained the mark as long as they had not given an incorrect statement about viruses. Several incorrect responses referred to the immune system or used poor terminology saying that the organisms attacked body cells.

(b) (i) Only a fifth of the students gained this mark. The question stated that the children in the groups were matched for age and gender; therefore a different factor that should be controlled was needed. The most common correct answers were mass or weight. Height or size did not gain the mark. Several students said “Previous illness” or “Severity of illness”, and many references to temperature were given. Very few students mentioned ethnicity.

(ii) The majority of students answered this question correctly with many mentioning the word “placebo”. Most of the other correct answers said “nothing”. Students who did not gain the mark generally said give them a different drug, for example, Calpol, or an antibiotic. Some said give them a larger dose of the drugs mentioned in the question.

(iii) There were some good responses relating to taking account of a psychological effect. Many gained the mark for saying that a placebo was used in order to see if the drug worked, but this was expressed in many different ways. Some said it was used for comparison or as a control. Only a few referred to accuracy, fair testing or to improve reliability, all of which were ignored.

(c) (i) Most students interpreted the graph correctly to gain the mark.

(ii) Only just over a fifth of students gained this mark, showing they had some difficulty in counting how many hours the body temperature was normal or below for the two groups.

(d) (i) Many students lost marks because they did not write comparative statements. Saying that ibuprofen reduced the temperature quickly was insufficient. It was necessary to say that ibuprofen reduced the temperature faster, more or for longer. Many said that ibuprofen worked better or more effectively, but this was too vague to be awarded a mark. A few students attempted to compare all three groups, rather than ibuprofen (alone) with paracetamol (alone).

(ii) Over half of the students gained 1 mark for saying that ibuprofen maintained body temperature close to normal. There was a lack of understanding that there is a range for normal body temperature, and many students thought that lowering the body temperature below 37 °C was harmful. A vague statement such as“Ibuprofen is almost as good” or “almost as effective” was not creditworthy; students had to give an example of this, for example, it decreased the temperature at a similar rate.

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