AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.1 HOMEOSTASIS (PACK 3)

SCORE	PERCENTAGE
/126	%

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Q1.

(a) (i) protein

for 1 mark

1

(ii) e.g. molecules too large

for 1 mark

1

(b) e.g. most of water reabsorbed, but little urea

for 1 mark

1

(c) (i) restores concentration of dissolved substances, to normal level,
wastes pass into dialysis fluid

for 1 mark each

3

(ii) the same (0.35) or slightly below (<0.35),
so that concentration of salts in blood remains constant

for 1 mark each

2

[8]

Q2.

(a) more energy needed,
for increased muscular activity

for 1 mark each

2

(b) increased sweat production,
evaporation of sweat cools body,
vasodilation OWTTE,
more heat loss (by radiation)

for 1 mark each

4

[6]

Q3.

(i) *idea that* reduce water loss (in dry area) / conserve water

for 1 mark

1

(ii) ideas of evaporation (of moisture) uses energy / heat
or
large surface area of blood vessels / dilation of blood vessels
for evaporation / radiation

each for 1 mark

2

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(iii) ideas of large surface area of (small) vessels / intertwining results in close contact of vessels idea that cool venous blood cools arterial blood

each for 1 mark

2

[5]

Q4.

(a) (i) more
less
the same
(*accept* appropriate numbers)

for 1 mark each

3

(ii) sweating / evaporation / perspiration

for 1 mark

1

(b) in food / named solid food / eating
from respiration

for 1 mark each

2

[6]

Q5.

(a) all sectors correctly plotted – 2 marks one plotting error only – 1 mark
2 **or** more plotting errors 0 marks

breath = 3 sectors
urine = 6 sectors
sweat = 10 sectors

2

all sectors labelled

allow 2 labelled only

1

(b) respiration

1

breath

1

amino acids

1

urine

1

[7]

Q6.

(a) (i) all plots correct

Tolerance ± $\frac{1}{2}$ *square*
allow 1 mark for 2 correct plots

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2

(ii) 6

correct answer with no working = 2
allow 1 mark for (60 ÷ 100) × 10
N.B. correct answer from incorrectly recalled relationship / substitution = 0

2

(b) lungs

1

liver

1

kidneys

1

[7]

Q7.

(a) 180 **or** 179.9

1

(b) 99.4

1

[2]

Q8.

any **three** from:

heat produced by muscles

during exercise

accept when working

by respiration

(skin) temperature over muscles rises / more blood to skin over muscles

*allow vasodilation **or** arterioles dilate over muscles*
reject capillaries dilate
sweating neutral

[3]

Q9.

(a) 850

1

(b) (i) more

because exercise makes us sweat **or** work harder

accept to cool the body
do not credit body hotter or giving off more heat

2

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(ii) more

because she respires more

*accept she breathes (in and out) more **or** heavier **or** faster*

2

(iii) less

because (more) water has been lost by sweating **or** breathing out **or** other methods

accept arguments about conservation of water

2

(c) kidney

1

[8]

Q10.

(a) (i) in blood **or** the circulation system **or** plasma

*accept arteries and veins **or** blood vessels*
*do not accept slowly **or** in blood cells*

1

(ii) glands

*accept endocrine glands **or** endocrine*
do not accept a named gland

1

(b) the pancreas

accept islets of Langerhans

1

any **one** from

does not produce (sufficient) insulin
(blood) sugar is not (properly) controlled

1

insulin injections **or** inhalers

*accept diet **or** tablets to make the pancreas produce insulin*

1

[5]

Q11.

(a) increases

gains 1 mark

but
70 × more (concentrated)

gains 2 marks

2

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(b) *idea that*
water is reabsorbed;
urea is not reabsorbed (as much)

each for 1 mark

(credit (much) more water reabsorbed
than urea)

gains 2 marks

2

[4]

Q12.

ideas that
internal cooling/cooling of brain causes reduction in sweating and of blood flow to skin
less sweating = less loss of heat from skin (= X)
less blood flow = less heat supplied to skin (= Y)
X > Y (so temperature rises)

each for 1 mark

[4]

Q13.

(a) warmth/heat
oxygen/air
moisture
microbes/micro-organisms/fungi/moulds/bacteria

any three for 1 mark each

3

(b) do not rot

for 1 mark

1

[4]

Q14.

(a) *idea:*
filtered

for 1 mark

reabsorbed

gains 1 mark

but
all reabsorbed

gains 2 marks

correct reference to blood

for 1 mark

4

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(b) (i) *evidence of* $\frac{170 - 1.5}{170} \times 100$

gains 1 mark

but
99(.1)(%)
gains 2 marks

2

(ii) *idea:*
more urine
for 1 mark

body dries out/dehydrates
or
needs to drink more
for 1 mark

2

(c) no effect for first half hour/until 1 hour
rises to 210cm³/to 3x level after 1 hour
rises to 280cm³/to 4x level after 1½ hour
reference to 280cm³/1½ hour as maximum level
falls to (near) normal after 2½ hours
comparison of rates of change e.g. rapid then slower rise and/or steady fall
not all of 800cm³ excreted (extra to normal)
each for 1 mark to max. of 5
(do not credit simply rises then falls)

5

[13]

Q15.

idea:
glucose level rises
pancreas releases insulin
glucose → glycogen (in liver)/removes xs glucose
glucose level falls/returns to normal
for 1 mark each

[4]

Q16.

1 sector correct
gains 1 mark

but all sectors correct B = 2 S = 9 U = 8
gains 2 marks

all sections labelled correctly (w.r.t. sector size)
for 1 mark

[3]

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Q17.

- cost of dialysis and transplant <u>compared</u>

- *idea that* both expensive and may need to balance cost against other medical priorities
- restricted diet/movement with dialysis

and

- no restriction/independence for transplant

each for 1 mark

- *idea* that donated kidney may not be available
- transplant may be rejected/dialysis consistently reliable

[Credit problem of finding body access points for repeated dialysis over the long term]

[5]

Q18.

(a) *idea:*
more (fossil) fuel burned (do not credit simply more people/cars/industry)
deforestation = less photosynthesis
deforestation = more respiration/burning

each for 1 mark

3

(b) *idea*:
climate change

for 1 mark

warmer/colder/drier/wetter
food production affected/starvation
mayor ecosystems destroyed/damaged

any two for 1 mark each

6

<u>sea level rise</u>

for 1 mark

low land flooded
less food grown/starvation
homes/factories flooded

any two for 1 mark each

Allow
polar ice caps melt
sea water expands

[9]

Q19.

(a) sweat – 6 squares high
urine – 15 squares high

each to < half a square for 1 mark each

2

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(b) for *hot day (assumed unless otherwise stated)*

- same in breath
- same total
- more in sweat* / sweats more
- less in urine* / urinates less
- correct quantification of either * eg **x**cm^3 more / less or **n** times more / less
  250 cm^3 more sweat 6 × more sweat
  250 cm^3 less urine ¼ / 25% less urine
  any four • for 1 mark each
  [Do not allow just figures quoted from the table]

4

(c) *ideas that*

- you sweat more **<u>to keep cool</u>** on a hot day
- urine adjusted (by kidneys) to keep balance / to keep same total loss
  each for 1 mark
  [Accept "more sweat therefore less urine"]
  [Credit ideas from (c) if given in (b)]

2

[8]

Q20.

(a) breath same + sweat more* + urine less* (*All <u>three</u> needed)*
<u>or</u>
total same but split differently
for 1 mark

**either change correctly quantified eg*
x cm^3 more/less or **n** times more/less
for 1 further mark

sweat 250 more 6 x more
urine 250 less ¼/25%less

2

(b) *ideas that*

- you sweat (more) <u>to keep cool</u> on a hot day
- urine adjusted (by kidneys) to keep balance / to keep same total loss
  each for 1 mark

(NB credit these answers if in (a) candidates have answered more fully than expected)

2

(c) *ideas that*

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- when blood water normal/100% / steady kidney re-absorbs water at low/steady rate
- when blood water percentage falls, the rate at which kidney re-absorbs water rises
- when blood water percentage rises again, is high/normal the rate at which kidney re-absorbs water falls
- 97 / 97.5% / 98% (of normal) blood water is the point at which the kidney's reabsorption rate starts to increase / decrease

each for 1 mark

[allow idea that there is delay between blood water percentage changing and rate of re-absorption changing]

4

(d) *any reference to* hormone(s) / pituitary (gland)

gains 1 mark

but
ADH or hormone(s) from pituitary (gland)

gains 2 marks
(do not allow 'brain)

2

[10]

Q21.

(a) 1

for 1 mark

1

(b) (i) there will be less / no sodium (per day) (in her urine)

for 1 mark

1

(ii) *idea that*
she should take in more (sodium (chloride) / salt)
(*allow* stay indoors / in shade **or** be less active)

for 1 mark

1

(c) active transport / uptake
(*do not allow* diffusion / osmosis)
the concentration / gradient

for 1 mark each

2

[5]

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