AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.3 HORMONAL COORDINATION IN HUMANS (PACK 4)

SCORE	PERCENTAGE
/238	%

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Q1.

(a) 94.8

1

(b) (i) to cool (the body) / maintain (body) temperature

*do **not** accept let out heat*

1

(ii) water **and** ions

1

(iii) water ignore CO_2, and vapour

1

(c) any **two** from:

used in respiration

provides energy

(energy) needed for movement / running / muscle action

2

[6]

Q2.

(i) dialysis (machine) or kidney machine

1

(ii) (specially chosen kidney) similar tissue type

accept same blood group

1

(irradiation of bone marrow) to stop white cell production

allow any named white blood cell

1

(treated with drugs) suppress immune system

1

(sterile conditions) avoid exposure to pathogens / infection

1

[5]

Q3.

(a) (i) 6

1

(ii) 4

1

(b) (i) pancreas

ignore islets of langerhans

1

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(ii) 'X' anywhere between >1 and ≤ 2 hours

anywhere in that column

1

(c) any **four** from:

water movement

*do **not** accept solution*

out of cells

dilute to concentrated solution

accept reference to correct gradient -
*high Ψ to low Ψ **or** high to low 'water concentration'*
*must be unambiguous – i.e. **not** 'high to low concentration'*
accept low to high concentration

reference to partially / selectively permeable membranes **or** described

cells shrink / get smaller

allow crenated
ignore plasmolysed / flaccid / floppy
etc

4

[8]

Q4.

(a) pituitary (gland / body)

1

(b) oestrogen inhibits the release of FSH

ignore references to LH

1

FSH stimulates follicle development / causes egg to develop **or** no follicle / egg development if high oestrogen

accept growth / maturing / ripening for development

1

no ovulation / no egg release

*do **not** accept no egg to be fertilised*

1

[4]

Q5.

(a) (i) glucose passes through the filter / from plasma to filtrate

ignore diffuses

1

(ii) glucose is reabsorbed or glucose taken back into the blood

ignore filtered

1

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(b) protein (molecules) are (too) large (to pass through the filter)

1

(c) any **three** from:

blood becomes more concentrated / too salty / has lower water potential **or** too little water in the blood

hypothalamus detects this

release of ADH

by pituitary

increased **re**absorption of water

3

[6]

Q6.

(a) urea

1

(b) any **four** from:

- suitable for short term
  accept reverse arguments with respect to transplants
- no long term drug treatment
- no rejection chance
- no / less risk during surgery
  accept risk of anaesthetic
- operations unsuitable / risky for weakness / old age
- risk of infection
- no (suitable) kidneys available for transplant / long waiting list /
- ess painful

4

[5]

Q7.

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

- chemical messenger
- chemical / substance released in one part to have effect elsewhere in body
- chemical / substance which affects another / target organ / tissues / cells

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allow chemical from endocrine gland

1

(ii) in blood / circulatory system / any named part including plasma

extra wrong answer would cancel example

***not** red blood cells*

1

(b) **Quality of written communication**:
correct use of at least two relevant scientific term**s** spelt phonetically

e.g. pregnancy, ovulation, FSH, oestrogen, progesterone, ovary, follicle, circulation, thrombosis, feminisation, sperm count, STD

Q ✓ or Q ✗

1

any **three** from:

Oral contraceptives:

(benefit)

- prevent (unwanted) pregnancy **or** prevent egg release
- regulate menstrual cycle / periods

(problems)

- prolonged use may prevent later ovulation / cause infertility
- named side-effect on female body
  e.g. circulatory problems / weight gain / nausea / headache / breast cancer / mood swings
- increased promiscuity / increase in STD's / STI's
- named side-effect on environment
  e.g. feminisation of fish **or** lowered sperm count in human males

Fertility drugs:

(benefit)

- can enable woman to have children **or** to become pregnant
  or stimulates egg release

(problem)

- multiple births

*for full marks must score at least **one** re contraceptives **and** at least **one** re fertility drugs*

*if unclear which type of hormone maximum **2** marks from 3*

3

[6]

Q8.

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(a) aerobic

1

respiration

*'anaerobic respiration' = **1** mark*

1

(b) any **five** from:

- glucose is a small molecule
- glucose passes through filter **or** glucose is filtered out of blood **or** glucose enters the capsule / kidney tubule / Q
- glucose reabsorption **or** glucose taken (back) into blood

  *do **not** accept 'filtered' into blood / out of tubule*
- cells lining tubule have microvilli / shape described **or** cells lining tubule have large surface area
- active transport
- up concentration gradient
- use of energy / ATP
- long tubule for more reabsorption

5

[7]

Q9.

any **three** from:

FSH stimulates growth / maturing of follicle(s) / eggs

FSH stimulates oestrogen release

oestrogen stimulates development of uterus lining

oestrogen stimulates LH release / production

LH stimulates ovulation / egg release

[3]

Q10.

(a) semi / selectively / partially / differentially permeable

1

separates blood and dialysis fluid

1

(b) any **four** from:

blood cells cannot pass through membrane

glucose retained in blood

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to stop water passing into blood / osmosis

no (net) diffusion

urea removed from blood by diffusion

accept excreted

4

(c) problem may be temporary **or** has minor infection **or** problem could be cured by other means

1

operation / transplants carry risk

accept rejection

1

(d) (i) no antigens

1

on (the surface) of red blood cells

1

(ii) would cause agglutination / clumping if different

ignore clotting and coagulation

1

[11]

Q11.

(a) water content (within the body/blood) is kept constant/ regulated/within very narrow limits/kept right

*do **not** accept general definition of homeostasis*

1

(b) because optimum conditions are needed for processes within the body / enzyme reactions
or
because there is a need to maintain a steady internal environment

1

(c) excretion is the removal from the body of waste **products**

n.b. faeces is not an excretory product but may be neutral

1

because waste products would (build up and) **become** toxic/poisonous/harmful

*do **not** accept makes us ill*
*do **not** accept block up system*
*do **not** accept unwanted products*

1

[4]

Q12.

(a) (i) endocrine glands **or** endocrine system

allow a specific named gland

1

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(ii) (dissolved) in the blood(stream) **or** plasma

1

(b) (i) pancreas **or** islets of Langerhans

1

(ii) (it **or** insulin) lowers blood sugar level [1]

(by) (speeding up **or** increasing) conversion of glucose to glycogen [1]

in the liver [1]

(and) speeding up **or** increasing uptake of glucose by body cells [1]

4

[7]

Q13.

(a) any **three** from

increased thickness **or** build up for attachment of zygote **or** so zygote can implant;

allow gives more room for blood vessels

3

increased blood vessels to provide nutrients for zygote;

*allow embryo **or** fetus **or** baby **or** egg for zygote*

becomes thicker to form placenta;

increased surface area for attachment of zygote;

increased glands for secretion;

(b) (i) rise in hormone corresponds with rise in temperature;

*allow peak of hormone at same time as increased temperature **or** when hormone high, temperature is high*

*allow change in hormone concentration followed by change in temperature **or** when hormone rises followed shortly by rise in temperature **or** graphs follow same pattern **or** graphs are nearly the same*

1

(ii) maximum 36.90 °C

1

minimum 36.55 °C;

0.35 °C;

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*allow **both** marks for correct answer **or one** mark for 0.35 if clearly round up **or** round down allow one mark for working if correct*

1

[6]

Q14.

(i) liver

1

(ii) liver **or** B stores glycogen
or pancreas **or** D makes insulin

1

clear description of link

1

[3]

Q15.

(a) (i) increased shortly after ingestion then drops;

(ii) decreased shortly after ingestion then rises;

(iii) decreased shortly after ingestion then rises

each for 1 mark

3

(b) 8 of:
ingestion of ice cools blood flowing in (gut wall);
brain temperature lowered;
reduced blood temperature detected by brain;
impulses sent to sweat glands;
sweat production decreased/sweat pores close;
evaporation of sweat reduced;
it is evaporation of sweat which cools skin/heat loss is less;
therefore skin temperature rises;
because external temperature greater than body temperature;
sensibly linked example;

each for 1 mark

8

[11]

Q16.

(a) (i) transport of substances **or** named substance **or** blood around the body

each for 1 mark

2

(ii) breaks down *(**not digests**)* food absorption (into blood)

each for 1 mark

3

(b) water filtered from blood
smaller proportion reabsorbed

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therefore larger volume
of dilute urine produced

each for 1 mark

4

[9]

Q17.

(a) water filtered from blood
smaller proportion reabsorbed therefore larger volume of dilute urine produced

each for 1 mark

4

(b) (i) use of dialysis machine which restores concentrations of substances in blood to normal levels
transplant of healthy kidney **or** compatible kidney

each for 1 mark

4

(ii) 5 of e.g.:
dialysis needs much time attached to machine
consequent effect on lifestyle (qualified) need for special diet
transplant gives 'normal' life (qualified)
transplant cheaper in long term
risk attached to transplant operation
shortage of donors etc.

each for 1 mark

5

[13]

Q18.

(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]

Q19.

(a) moves from foetal blood to mothers blood via placenta

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for 1 mark each

3

(b) (i) 3 of e.g.
rising levels of oestrogen
result in an increased LH level when LH level peaks
egg release stimulated

any 3 for 1 mark each

3

(ii) 3 of e.g.
continues to inhibit FSH production and to inhibit LH production
so that no eggs are matured or released
Because of danger to later conceived fetus if 2 develop in uterus

any 3 for 1 mark each

3

(c) 3 of e.g.
FSH could stimulate eggs to mature in woman whose own level of FSH too low
LH could stimulate egg release where woman's own LH production depressed by oestrogen

any 3 for 1 mark each

3

(d) **maximum two benefits e.g.**
prevents unwanted pregnancy when mother's physical health at risk
or when mental health at risk
or following e.g. rape
maximum two problems e.g.
involves killing 'foetus' rather than preventing gametes meeting
may lead to irresponsible attitude to sexual behaviour
reference to ethical/religious attitudes

for 1 mark each

4

[16]

Q20.

(i) 2500 – 1000
= 1500

for 1 mark each

2

(ii) 3 of
filter blood
reabsorb water
in sufficient quantities to keep body water content constant
produce dilute urine if water content of body high/reverse argument

any 3 for 1 mark each

3

[5]

Q21.

(a) (i)
- blood sugar rises because
- insufficient insulin secreted by body

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for 1 mark each

2

(ii)
- increase in rate of conversion
- of glucose to glycogen
- in liver

for 1 mark each

3

(iii)
- muscles use more glucose from blood
- in respiration
- to release energy needed for exercise

for 1 mark each

3

(b) 3 of

sugar soluble
therefore absorbed
quicker than starch
which has to be digested

any 3 for 1 mark each

3

(c)
- increased secretion of glucagons
- by pancreas
- results in increases rate of conversion of glycogen into glucose

for 1 mark each

3

(d) 3 of e.g.

higher blood sugar level results in increased secretion of insulin
effect of insulin is to lower blood sugar
which in turn reduces rate of insulin secretion
overall result is to keep fluctuations in sugar level to a minimum

any 3 for 1 mark each

3

[17]

Q22.

(a) urine

for 1 mark

1

(b) (i) protein

for 1 mark

1

(ii) e.g. molecules too large

for 1 mark

1

(c) reabsorbed into blood

for 1 mark

1

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

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for 1 mark

1

[5]

Q23.

(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]

Q24.

(i) reduction in FSH levels will lead to reduction of oestrogen production,
therefore oestrogen production is negatively affected
by high oestrogen levels

for 1 mark each

2

(ii) high levels of FSH,
more likely to lead to egg release/maturation

for 1 mark each

2

[4]

Q25.

(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

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[6]

Q26.

(a) (i) *idea that* chemical / substance that controls / co-ordinates bodily process

for 1 mark
reject chemical messenger unless qualified as above,- reject
ref. to one hormone only

1

(ii) in the blood

for 1 mark

1

(b) *idea that*
device indicates / detects low levels / no hormones / relevant hormone

for 1 mark

1

[3]

Q27.

(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]

Q28.

(a) pituitary (gland)

1

ovaries

1

allow corpus luteum

(b) idea of stimulating release of eggs

1

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preventing release of eggs

allow FSH increases fertility
accept contraception / contraceptive pill / morning after pill
allow oestrogen decreases fertility
accept progesterone affects uterus lining
*do **not** credit simply 'a hormone to increase fertility **or** a hormone to decrease fertility'*
*do **not** credit 'pill' unqualified **or** injections*
*do **not** accept just FSH **or** oestrogen **or** IVF with no effect stated*

1

[4]

Q29.

(a) (i) all plots correct

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

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]

Q30.

ovaries

accept ovary

1

womb

accept uterus

1

fertility

accept FSH
*do **not** accept fertilisation*

1

contraceptive(s)

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allow birth control
*accept oestrogen **or** progesterone*
*do **not** accept pill alone*

1

[4]

Q31.

(a) 180 **or** 179.9

1

(b) 99.4

1

[2]

Q32.

(a) any **two** for one mark each

answers should relate to the ideas in the list

birth control pills are 99 % effective in preventing pregnancy

the hormones in the pills give protection against some women's diseases

condom (neutral)

the woman's monthly periods become more regular

2

(b) any **two** for one mark each

answers should relate to the ideas in the list

the hormones in the pills have some rare but serious side effects

only 99% effective

this method of birth control provides no protection against sexually transmitted disease

a woman has to remember to take a pill every day

2

[4]

Q33.

(a) (i) meiosis

1

(ii) mitosis

1

(c) (i) **X** pituitary

1

Y FSH

1

(ii) stimulates LH production

1

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inhibits FSH production / production of **Y**

1

[6]

Q34.

(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

(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]

Q35.

(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

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

1

[5]

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