AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.3 HORMONAL COORDINATION IN HUMANS (PACK 3)

SCORE	PERCENTAGE
/228	%

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Q1.

(a) (i) protein

1

(ii) (protein molecules too) large

1

cannot pass through filter **or** can't leave blood **or** can'it pass into kidney tubule / named part

*NB holes in the filter are too small = **2** marks*

1

(b) any **four** from:

- use of partially permeable membrane **or** only small molecules can pass through membrane
- dialysis fluid has 'ideal' concentrations of solutes

  allow correct named example
- diffusion of waste substances out of blood

  accept named example – eg urea

  or
  waste passes from high to low concentration
- reference to equilibrium (between plasma & dialysis fluid)

  accept reference to counterflow to maintain concentration gradient

4

[7]

Q2.

(a) costs less

1

no / less equipment needed

1

(b) any **two** from:

- lower success rate / only 19.7% success rate
- not all cases can be treated
  or
  only 50% of cases can be treated
- embryo can't be seen until third day

2

[4]

Q3.

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only 24 students tested **or** only one test **or** reference to lack of controls eg gender / age

1

students could drink as much water as they wanted

or

some students drank more water than others

or

some students drank water and beer

1

differences only slight

ignore effects of beer or promotion of beer drinking

1

[3]

Q4.

(a) FSH / follicle stimulating (hormone)

1

LH / luteinising (hormone)

either order

1

(b) any **three** from:

*max **2** if only advantages **or** only disadvantages discussed*
allow reverse arguments

advantages of Invocell eg

- low(er) cost
- quick(er)
- laboratory / incubator / equipment not <u>needed</u>
- more convenient

ignore can be done in doctors surgery

3

disadvantages of Invocell eg

- low(er) success rate
- embryo development cannot be monitored
- can not be used where male is infertile
- only tested on 800 women
- (risk of) infection / pain in vagina

ignore sedation

argued conclusion

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*must include reference to **both** advantages and disadvantages and must be at end of answer*

1

[6]

Q5.

(a) pancreas

1

(b) any **one** from

- (controlling / changing) diet

  accept descriptions as to how diet could be changed eg eat less sugar(y foods) ignore reference to fat / protein

- exercise

  accept example eg go for a run

- pancreas transplant

  accept named drug eg metformin

1

(c) (i) increase

ignore reference to women

1

then fall

1

relevant data quote (for male)

max at ages 65 - 74

*eg starts at 10 (per thousand) **or** max at 130 (per thousand) **or** ends at 120 (per thousand)*

accept a difference between any pairs of numbers in data set

quoting of scale or per thousand but not 'thousands'

accuracy ± 2

1

(ii) *ignore numbers*

(between 0 and 64) more females (than males) / less males

allow eg females more diabetic than males

1

(over 65) more males (than females) / less females

1

[7]

Q6.

(a) B

no mark for ÉBÉ, alone

large(r) surface / area **or** large(r) membrane

accept reference to microvilli

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accept reasonable descriptions of the surface
*do **not** accept wall / cell wall*
ignore villi / hairs / cilia

1

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

- insulin / hormone
  if named hormone / enzyme must be correct for pancreas
- enzyme / named enzyme

1

(ii) many ribosomes

1

(ribosomes) produce protein
accept insulin / hormone / enzyme named is (made of) protein

or

allow many mitochondria (1)

provide energy to build protein **or** to make protein (1)
accept ATP for energy

1

[4]

Q7.

(a) (i) liver

1

(ii) kidney
allow urethra / bladder
ignore ureter

1

(iii) (excess) protein / named / amino acids
accept amino / ammonia

1

(b) less / no sweating
allow ideas of how sweat glands change in order to reduce sweating

1

less heat lost / evaporation

1

(c) (i) become narrower / constrict
allow contract / get smaller etc
allow less blood flows through vessels
*do **not** allow capillaries become narrower **or** reference to movement of vessels*

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1

(ii) reduced / no heat loss

allow heat gained from room

1

[7]

Q8.

(a) (i) too large to pass through the filter

1

(ii) passed through the filter, then reabsorbed into blood

1

(iii) water is reabsorbed from the filtrate into the blood

1

(iv) water, urea and sodium ions

1

(b) (i) less urine

1

(ii) more concentrated

1

[6]

Q9.

(a) (i) movement of atoms / molecules / ions

accept particles

allow dissolved substances

ignore reference to membranes

1

(substance) moves from high to low concentration

allow down the gradient ignore

across / along / with a gradient

1

(ii) any **two** from:

- movement of molecules / ions

  accept particles

  allow dissolved substances this point <u>once</u> only in (a)(i) and (a)(ii)

- from low to high concentration

  allow up / against the gradient

  ignore across / along / with a gradient

- requires energy / respiration

  accept requires ATP

2

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(b) • **filtration** of blood **or**
described re small (molecules)through / large not
ignore diffusion

1

max **four** from:

• **reabsorption** / substances taken back into blood

• (reabsorption) of all of the sugar / glucose

• (reabsorption) of some of ions / of ions as needed by body

• (reabsorption) of some of water / of water as needed by the body

• urea present in urine
accept urea not reabsorbed

• reabsorption of water by osmosis / diffusion **or** reabsorption of sugar / ions by active transport

4

[9]

Q10.

(a) 21

1

(b) 1/26 or 8/208 or 4/104 or 2/52 **or** 3.8%
allow 'out of' in each case

(c) under 35

2

(d) any **two** from:

• low success rate **or** not always successful

• high number of multiple births

• expensive

• stressful / emotional

• side effects

2

[5]

Q11.

(a) respiration
clear indication eg tick, underlining, others crossed out

1

(b) lungs

1

(c) liver

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1

(d) amino acids

1

[4]

Q12.

(a) (i) pancreas

allow phonetic spelling

1

(ii) glucose into cells / liver / muscles

allow any named organ / cell

allow turned into / stored as glycogen

but

*do **not** allow hybrid spellings for glycogen*

allow increases respiration

allow stored as / turned into fat

1

(b) (i) reference to "98.6% of all people who used Diacure reported an improvement in their condition".

*allow claim **1** / **1** / the first one*

1

(ii) (only) 30 patients **or** not enough / not many patients

*allow only one trial **or** only done once **or** not repeated*

ignore bias

1

(iii) little effect / difference

allow no effect

allow only drops by 4 (±1)

1

suggest drug is not effective (in long term)

allow wouldn't persuade people to take it

1

(iv) avoid bias / owtte

eg company could change / ignore results / might lie

ignore fair / accurate / reliable / valid

1

[7]

Q13.

(a) 178

ignore working or lack of working

*correct working: 180 – 2 but no answer / wrong answer = **1** mark*

2

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(b)

Man A	Man B
higher	lower
lower	higher
lower	higher

all 4 cells correct = **2** marks
2 or 3 cells correct = **1** mark
0 or 1 cells correct = **0** mark

2

[4]

Q14.

(a) (i) **A**

1

(ii) (protein) molecule is large
ignore letters

1

cannot pass through filter
*(protein is) too big to get through the filter = **2** marks*

1

(b) **B** is taken back into the blood **or B** is reabsorbed

1

reabsorbed completely
or reabsorbed after filtration

1

(c) RBC is too big to pass through filter

1

Haemoglobin is inside red blood cells
or haemoglobin released when red blood cell bursts

1

Haemoglobin is small enough to pass through filter
or haemoglobin diameter < pore diameter

1

[8]

Q15.

(a) any **three** from
*if oestrogen **or** progesterone <u>used</u> = max 2*
*if both oestrogen **and** progesterone <u>used</u> = max 1*

- FSH <u>used / given / injected</u>
- LH <u>used / given / injected</u>

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- FSH causes eggs to mature
- LH stimulates egg release

ignore <u>effects</u> of oestrogen and progesterone

3

(b) max **two** pros for IVM / it from:

*allow max **two** cons for IVF*

- cheaper
- less hormones used
- ovarian hyperstimulation **or** the syndrome less likely

allow 'it's safer for the mother'
ignore 'more risks' unqualified

- IVM treatment shorter

2

con for IVM

*allow max **one** pro for IVF*

- small risk of abnormal sex chromosomes / birth defects / baby cancer

allow 'more risk to baby'
ignore 'more risks' unqualified

1

evaluation

eg IVM better because less risk to mother outweighs small risk to baby

or

IVF better because no risk to baby and a small risk to mother

must include an appreciation that there are two sides to the argument

1

[7]

Q16.

(a) $\frac{1}{5}$ / 20% / 1 in 5 / 1 : 4 / 0.2 /

any correct proportion
ignore working
*do **not** allow 1 : 5*

$\frac{600}{3000}$ / 600 : 2400 / 600 in 3000

*award **1** mark for*
*selection of 3000 **and** 600*

2

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(b) (i) sweat / sweating / perspiring

allow cooling / for cooling / to lose heat / to cool

1

(ii) the volume of water in the urine decreases.

1

the volume of water taken as food or drink increases.

1

(c) (i) liver

apply list principle

1

(ii) kidney

apply list principle

1

(iii) bladder

apply list principle

1

[8]

Q17.

(a) (i) 50

*award **2** marks for correct answer irrespective of working*
*award **1** mark for selection of 60 **and** 10*

2

(ii) any **two** from:

- increases
- (then) decreases
- highest at 65 – 74 (years old) **or** maximum 112 (per thousand)

allow peaks at 65 - 74
ignore comparisons with men

2

(b) (i) stomach

1

(ii) any sensible reference to diet **or** carbohydrate intake **or** pancreas / stem cell transplant

*eg eat less / no sugary food **or** eat more fibre **or** go on a diet **or** watch what you eat*
ignore eat more protein
*do **not** accept reduce salt*

1

[6]

Q18.

(a) (i) (wholemeal bread)
any **two** from:

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lower maximum / peak / less change

1

slower rise / change

*ignore references to rate of fall **or** first to peak*

need to take less insulin / less likely to hyper

*no mark for identifying the type of bread but max **1** mark if not identified*

1

(ii) any **four** from:

- amylase / carbohydrase
- starch to sugar
  allow starch to glucose
- (sugar) absorbed / diffused / passes into blood
- correct reference to pancreas
  allow once only as rise or fall
- insulin produced
- glucose (from blood) into cells / tissue / organ **or** named tissue / organ
  allow glucose to glycogen
- glucose used in respiration / for energy
  max 3 for explaining rise
  max 3 for explaining fall

4

(b) any **three** from:

advantages (compared to insulin injections):

- (may be) permanent / cure
- no / less need for self monitoring
- no / less need for insulin / injections
  ignore reference to cost
- no / less need for dietary control

disadvantages (compared to insulin injections):

- low success rate
- (may) still need insulin / dietary control
- operation hazards
- risk of infection from donor

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- rejection / need for drugs to prevent rejection

  *max **2** if only advantages **or** only disadvantages discussed*
  can give converse if clear that it relates to insulin injections

3

[9]

Q19.

(a) mineral ions

1

water

*each extra box ticked cancels **1** mark*

1

(b) (i) blood plasma

1

(ii) dialysis fluid

1

(iii) diffusion

1

(iv) partially permeable

1

(v) small

1

(c) drug treatment is needed to suppress the immune system

1

[8]

Q20.

(a) (i) no effect / little effect

1

(ii) reduced

ignore reference to <u>later</u> increase

1

(b) (i) <u>more</u> (re)absorption

do not allow if extra incorrect reference to filtration made

1

or more (material) taken into blood

of water

*allow **only** if linked to reabsorption*
*do **not** accept water if in a list of substances*

1

(ii) ions in blood diluted

1

or concentration of ions decreases

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increased water reabsorption

do not allow if extra incorrect reference to filtration made

or more water present in blood

accept sensible alternative suggestion
eg reabsorption of ions disrupted

1

[6]

Q21.

(a) (i) lungs

1

(ii) skin

1

(iii) kidneys

1

(b) (i) (as sweat lost,) performance falls

1

(ii) drink water / sports drink

ignore antiperspirant

1

[5]

Q22.

(a) 4000

*award **both** marks for correct answer, irrespective of working*
*1500 + 2000 + 500 gains **1** mark*

2

(b) day 2 (no mark)

any **two** from:

*max **1** mark if correct day not identified or if no day given*

- more (water in) breath / breathing
- more (water in) sweat / sweating

  accept a lot of sweating
- less (water in) urine

  *if no other marks awarded allow **1** mark for more water lost on day 2*

2

(c) (i) respiration

1

(ii) cools / removes heat owtte

ignore 'maintains body temperature' unqualified

1

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(iii) osmosis

1

[7]

Q23.

(a) any **two** from:

- amylase / carbohydrase
- protease

  allow trypsin
- lipase

2

(b) (i) high / above normal blood sugar
or cannot control blood sugar

allow other symptoms
*eg frequent / plentiful urination **or** sugar in urine **or** thirst **or** weight loss **or** coma*

ignore consequential effects eg blood pressure / circulation / glaucoma / tiredness

1

(ii) any **one** from:

- small / regular meals
- low sugar (meals) or low GI / GL **or** carbohydrates as starch

  allow high fibre

  ignore reference to low carbohydrate

1

(iii) any **one** from:

- keep constant(blood) sugar **or** prevent high (blood) sugar **or** reduces surge / rush of sugar into blood
- reduce the need for insulin

1

(iv) (take) insulin

allow pancreas transplant

1

(c) protein / hormone / enzyme synthesis **or** synthesis of named example **or** combine amino acids

1

[7]

Q24.

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(a) (i) bladder

1

(ii) glucose

1

protein

extras – CANCEL

1

(b) (i) any **two** from:

- kidney functions all the time / not just 3 × 8 h sessions a week
  allow direct quotation of correct points from the list
- can eat high-protein foods / high salt foods
  allow can eat anything
- cheaper
- waste of time

2

(ii) have to take (immunosuppressant) drugs / consequence of this
eg catch infections / may suffer brain damage / possible rejection of kidney **or** become ill more easily
or
risk of brain damage (due to anaesthetic)
allow direct quotation of correct points from the list

1

(c) (i) urea

1

(ii) 4.2

1

[8]

Q25.

(a) any **three** from:

- glucose enters blood from gut / liver / glycogen
- glucose is <u>filtered out</u> of the blood
  ignore 'diffusion'
- glucose is (a) small (molecule)
- taken / etc back into the blood / reabsorbed
  *allow absorbed into the blood but **not** absorbed unqualified*
- by active transport
  ignore diffusion

3

(b) (i) <u>in a healthy person</u>

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protein not present because proteins are large (molecules)
or because cannot pass through (filter)

1

<u>in person with disease</u>

lets protein through (filter) owtte

1

(ii) <u>advantages</u>:
up to any **three** from:

- no build-up of toxins / keeps blood conc. ± constant
  ignore 'kidney works all the time'
- prevent high blood pressure
- don't need restricted diet / restricted fluid intake
  or time wasted on dialysis
- blood clots may result from dialysis
- infection may result from dialysis
- with dialysis, blood may not clot properly
  due to anti-clotting drugs
- cost issues (ie transplant cheaper)

3

<u>disadvantages</u>: **<u>at least one</u>** <u>from</u>:

- rejection / problem finding tissue match
- use of immuno-suppressant drugs → other infections
- dangers during operation / example described
  must have <u>at least one</u> advantage and <u>at least one</u> disadvantage for full marks

1

[9]

Q26.

(a) A sperm

1

B egg

1

C fertilised egg

1

D embryo

1

(b) insert into mother
ignore fertilise / check fertilisation / check viability

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1

womb / uterus

1

(c) (i) one quarter

1

(ii) no / little chance of success over 42

*the statement 'only 2 out of 53 became pregnant / had babies' gains **2** marks*

1

reference to table of only 2 women became pregnant

1

(iii) so fewer twins / multiple births

or

multiple births more dangerous

1

[10]

Q27.

(a) (i) 1400

*award **2** marks for correct answer if no working shown*
*2400 – (300 + 600 + 100) or equivalent for **1** mark*

2

(ii) $\frac{1}{3}$

1

(b) **A**: chemical reactions

B: food

C: drinking

*all **three** required for **1** mark*

1

(c) cools / reduces temperature

allow 'maintaining body temperature' owtte
*do **not** allow regulate unqualified*
ignore reference to urea
numerical references to temperature should be correct

1

(d) more sweat produced

1

less urine produced

1

[7]

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Q28.

(a) pancreas

1

(b) protease

allow proteinase

1

(c) (i) (same) enzymes / named enzymes produced in other parts / named parts of digestive system

if named, enzymes and part must be correct

1

(ii) diet / activity varies / amount of glucose in blood varies

accept too much insulin leads to coma / hypo / low blood sugar

accept too little insulin leads to coma / hyper / high blood sugar

1

(d) any **two** from:

pros

- less / no experimentation on humans
- dogs (more) similar to humans (than lower / named organisms)
- it allows us to find a treatment **or** improves medical understanding

accept allows us to find a cure

cons

- harmful / cruel to dogs

accept kills dogs

- dogs may not be (metabolically) like humans

2

conclusion justified by argument

1

[7]

Q29.

(a)

glucose	☑
urea	☑
water	☑

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sodium ions ☑

protein ☐

*all 3 correct = **2** marks*
*2 correct = **1** mark*
*0 or 1 correct = **0** marks*

max 2

(b) (i) protein cannot pass through filter

or

protein (too) large

or

protein stays in the blood

1

(ii) reabsorbed

1

(c) (i) less

1

(ii) more

1

[6]

Q30.

(a) (i) protein is large (molecule) / too big to pass through filter

1

(ii) glucose is present in the filtrate
ignore units

1

or

0.8 in filtrate

no glucose is present in the urine

or

0 in urine

1

(iii) active transport – up / against (concentration) gradient
it = active transport throughout

1

or

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from low to high (concentration)

uses energy / ATP

*accept needs specific carrier / specific protein (in cell membrane) for **1** mark*

1

(b) water reabsorption / taken out

other substances cancel mark

or

water taken into blood / body

1

[6]

Q31.

any **two** from:

- more or most ions / sodium / chloride **or** replaces ions / sodium / chloride

  *do **not** accept more ions / sodium / chloride for energy*

- lost in sweat
- to keep blood concentration constant
- less sugar therefore less chance of 'sugar rush'

[2]

Q32.

(a) have identical genes / chromosomes / genetic material

1

since asexual reproduction

accept mitosis

1

(b) mixture of genes / chromosomes / genetic material from two parents

accept meiosis

1

sexual reproduction / fusion of gametes

1

(c) public misunderstand technique as cloning **or** worried about large numbers of clones **or** moral / ethical / religious issues **or** unnatural process **or** scientists must not play god **or** technique may lead to embryo death

*do **not** allow mark for embryos lost*

1

[5]

Q33.

(a) inhibits FSH (production / secretion)

1

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(therefore) no eggs mature / released

if no other marks gained allow 1 mark for no eggs produced

1

or

effect of FSH on ovary described

references to LH are neutral

(b)

maximum 4 marks if no conclusion

Pros max 2marks from 4 marks e.g.

- large scale trial gave better results
- chose uneducated women so that if these women could use it correctly, women elsewhere would be able to cons max 3 marks from 4 marks e.g.
- used pill with high dose of hormone – **either** so results not valid for general use of hormone **or** dangerous
- side effects ignored
- women not told pill was experimental / pill might have side effects
- no placebo
- should have tried a range of doses
- should have done pre-trial to check for side effects

4

conclusion 1 mark e.g.
trials flawed therefore cons outweigh pros

accept reverse e.g. trials flawed but pros outweigh cons

1

[7]

Q34.

(a) any **three** from:

- water

  allow breathing / oxygen / carbon dioxide

- ions / minerals / salts

  allow sodium / chloride, other ions neutral

- temperature

  allow heat

- blood sugar
- heart rate

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- blood pressure
  ignore urea

3

(b) contraceptive drug

1

fertility drug

1

(c) (i) eg nicotine, alcohol, cocaine, heroin, painkillers, tranquilisers, LSD
allow cannabis / weed or other alternative names
allow tobacco
ignore smoking / ecstasy

1

(ii) alters body chemistry **or** craving / needing / dependence
allow psychological dependence

1

withdrawal symptoms on stopping
allow withdrawal described
allow 'feel ill without it'

1

[8]

Q35.

(a) ovary or ovaries

1

(b) (hormone) implant

1

(c) do not have to remember to take

1

(d) does not involve hormone
allow coil may be dislodged

or
it is a mechanical method
allow egg <u>is</u> fertilised / released
allow not preventing egg fertilisation / release

1

(e) involves death of fertilised egg
allow embryo / baby for fertilised egg

or
(regard) fertilised egg as human
ignore against religion only
allow fertilised egg is alive

or
stops fertilised egg developing

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ignore side effects

1

(f) (i) inhibit FSH (production)

allow inhibits LH

1

so no eggs mature / develop / are produced

allow (LH) <u>stimulates</u> egg release

ignore progesterone

1

(ii) contains FSH

allow contain LH

1

which causes egg to mature / develop / be produced

allow (LH) <u>stimulates</u> egg release

or

in women whose FSH is low

1

[9]

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