AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.3 HORMONAL COORDINATION IN HUMANS (PACK 1)

SCORE	PERCENTAGE
/321	%

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Q1.

(a) to allow implantation of the embryo

1

(b) oestrogen

1

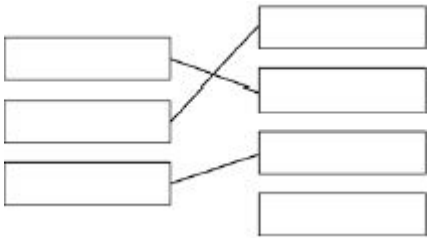
(c) 13 / 14 / 15 / 16

allow any number in range 13 to 16

allow any range within these values e.g. 14−16

1

(d)



extra line from a method cancels the mark

1
1
1

(e) more reliable than diaphragm / spermicidal cream

allow fewer pregnancies than diaphragm / spermicidal cream

1

low chance of pregnancy

allow only 1 more pregnancy than the pill (per 100 women per year)

allow almost as good as the pill

allow reference to one named example

1

no side effects

allow easy to get / buy

allow easy to use

allow prevent / reduce spread of STDs / gonorrhoea / HIV

ignore cost

1

[9]

Q2.

(a) pancreas

1

(b) liver

1

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glycogen

1

in this order

(c) would be digested / broken down (by enzymes / protease / pepsin / acid or to amino acids)

allow denatured (by acid)

1

(d) use of 14.2 **and** 6.8

1

7.4

*allow an answer of 7.2 or 7.3 (using 14.1 and / or 6.9) for **1** mark*

1

*an answer of 7.4 scores **2** marks*

(e) any **one** from:

- (person A's) results are higher

  ignore A peaks at a higher level than B

- (A) increases for a longer time **or** peaks later

- (A) takes longer to decrease **or** takes longer to return to normal

  allow other correct comparisons

  allow a description using pairs of figures from graph at a given time

1

allow converse comparisons with person B as the subject

(f) a negative correlation

1

(g) less carbohydrate / sugar / fat in diet

allow go on a diet
allow eat less
allow balanced / healthy diet

or

lose weight **or** maintain a healthy weight

ignore diet unqualified

1

(more) exercise

allow examples of exercise

1

[10]

Q3.

(a) 2400 **and** 2280
or
500 **and** 380

1

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120

1

*an answer of 120 scores **2** marks*

(b) respiration of glucose

1

(c) (more) sweating

ignore reference to vasodilation / vasoconstriction

1

(because) exercise releases heat
or
need to cool the body
or
need to lose heat
or
need to maintain body temperature

*do **not** accept energy being produced*

1

(d) more energy needed

*do **not** accept energy production*
*do **not** accept energy needed for respiration*

1

(so) more (aerobic) respiration

1

(so) increased breathing (rate / depth) (to supply oxygen **or** remove carbon dioxide / water)

1

'more' does not need to be stated a second time to gain marking point 1 and marking point 2

[8]

Q4.

(a) 3.7

1

(b) 2

1

(c) (different combinations of alleles cause) many / 22 values

allow continuous variation

or
in-between values
or
large range of values
or
there are not only two values

*allow there are not only 3 values if 3 is given in part **(b)***

1

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(d) different protein made

allow change in shape (of enzyme) or change in 3-D structure
ignore denature

1

active site changed

1

so substrate does not fit / bind

allow description of substrate
allow cannot form E-S complex
ignore lock and key description

1

(e) produces (some) offspring with high-fat milk
or
not all offspring have low-fat milk

ignore reference to alleles

1

(f) takes less time (to obtain results)
or
more offspring at the same time

*allow other sensible suggestion − e.g. allows screening **or** allow cow 7 to continue to produce eggs **o**r avoid injury to cow 7 during mating or giving birth*

1

(g) male gametes correct: d (and d)

1

female gametes correct: D and d

1

*allow **1** mark if gametes are correct but gender not identified*

correct derivation of offspring genotypes from given gametes

*allow 2 × 2 **or** 2 × 1 derivation*

1

Dd identified as low-fat **and** dd identified as high-fat in offspring

if DD offspring are produced, must also identify as low-fat

1

(h) find female with low(est) fat in milk **and** high(est) milk yield

allow choose from 7, 9, 12, 13 which has the highest yield

1

find male whose female offspring have high(est) milk yield **and** low(est) fat in milk

allow choose from 16 or 18 whose female offspring has the highest yield

1

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or

find female with lowest fat in milk
or cow 13 (1)*

**or*
allow female with high(est) milk yield

find male whose female offspring have high(est) milk yield (1)*

**or*
allow male whose female offspring have lowest fat in milk / male 16

cross the best (for both features) female with the best male

1

select best offspring (for both features) from each generation and repeat for several generations

1

[16]

Q5.

(a) **A**

1

(b) **E**

1

(c) 28

allow 27–29

1

(d) progesterone

1

(e) any **two** from:

- inhibits FSH production / release
- prevents egg maturation

  allow prevents egg growth
- prevents ovulation

  allow prevents egg release
  ignore prevents egg production

2

(f) oestrogen

1

testosterone

allow in this order only

1

[8]

Q6.

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(a) any **three** from:

- a (chemical) messenger
  or
  an organic substance
  allow correct named example – e.g. protein / modified amino acid / catecholamine / steroid
- made by the endocrine system / an endocrine gland / endocrine organ
  allow made by / released from a (ductless) gland
- affects (a) specific / target organ(s) / tissue(s)
- released into the blood
  allow carried by the blood

3

(b) insulin **and** glucagon
*both required for **1** mark correct spelling only for glucagon*

1

(c) **Level 2 (3-4 marks):**
Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 1 (1-2 marks):
Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.

No relevant content (0 marks)

Indicative content

- (0−0.5 h:) glucose from meal enters blood
  or
  increase in blood glucose (to 6.5 mmol / dm^3)
- glucose detected by pancreas
- pancreas secretes insulin
- (insulin causes) glucose to move (out of blood) into cells / liver
- liver converts glucose to glycogen
- causing a fall in blood glucose (after 0.5h)
- low blood glucose (< 5.0 mmol / dm^3) detected by pancreas
- pancreas releases glucagon
- liver converts glycogen to glucose (which enters blood)
- blood glucose rises (after 1 h **or** to 5.2 mmol / dm^3 (at 1.5 h))

[8]

Q7.

(a) less sweating so less water loss

1

(as) no / little water available in desert

1

(b) (fat store) can be metabolised / respired to water

1

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(little urine…) conserve water

1

(hard mouth) not damaged by spines on plants / on food
or
not damaged by hard / dry food

1

(c) dromedary / *C.dromedarius*
and bactrian / *C. bactrianus*

no mark for the names, but must be identified

because
same genus

ignore 'both are Camelus'

1

(d) any **two** from:

- the fossil record
- oldest fossils in N. America
  or
- newer fossils in S. America / in Asia / in Africa

*allow numbers for ages (45 Mya **and** 3 Mya / 6 Mya)*

- chemical / DNA analysis of living species

allow radioactive dating of fossils

2

(e) isolation of separate camel populations by sea
or
by mountains

1

habitat variation / described between populations

allow examples – biotic (e.g. food / predators) or abiotic

1

genetic variation / mutation in each population

1

45 million years is sufficient time to accumulate enough mutations

1

natural selection
or
better adapted survive to reproduce

1

pass on favourable allele(s)

allow gene(s)

1

[14]

Q8.

(a) liver

1

(b) insulin

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*do **not** accept glucagon*

1

(c) kidney

1

(d) to replace water / ions / salt

1

(that is) lost in sweat

1

[5]

Q9.

(a) **A** – pituitary

1

B – adrenal

1

(b) ovary

1

(c) diaphragm

allow phonetic spelling

1

(d) condom

1

(e) **Level 2 (3–4 marks):**
A detailed and coherent evaluation is provided which considers a range of advantages
and disadvantages and comes to a conclusion consistent with the reasoning.

Level 1 (1–2 marks):
An attempt to describe the advantages and disadvantages is made, which may not come to a conclusion. The logic may be inconsistent at times.

0 marks:
No relevant content.

Indicative content

advantages of the plastic IUD:
- is effective for longer than the copper IUD
- does not need to be replaced as often as the copper IUD
- although the pain of periods are more severe, the pain with the copper IUD is likely
  to be worse
- can reduce the bleeding during a period
- most of the possible side effects are not serious, eg feeling sick, acne and headaches.

disadvantages of the plastic IUD:
- needs to be implanted for a period of time before it is effective ie not emergency contraception
- can make the pain of period more severe

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- can cause more side effects than the copper IUD
- can cause some more severe side effects such as cysts on the ovaries

an understanding that the side effects are only possible and may not necessarily occur

additional examiner guidance:
- pupils should add value to the points in the table and should not just be copies verbatim
- credit can also be given for other correct advantages and disadvantages from the candidates' own knowledge and understanding
- allow converse points if clearly made

4

[9]

Q10.

(a) if too high <u>insulin</u> released from pancreas

1

so glucose is moved into cells

allow glucose is stored

1

if too low, <u>glucagon</u> is released (from pancreas)

1

causes glycogen to be converted to glucose <u>and</u> released into the blood

1

(b) type 1 not enough / no insulin produced

1

whereas type 2 cells do not respond to insulin

1

type 1 is treated with injections of insulin

1

whereas type 2 is treated with diet and exercise
or
loss of weight
or
drugs

1

(c) $(3.45 \times 10^6) + (5.49 \times 10^5) = 3.999 \times 10^6$
or
3 450 000 + 549 000 = 3 999 000

allow 3.999×10^6 ***or*** *3 999 000 with no working shown for* ***1*** *mark*

1

$$\frac{3.999 \times 10^6}{6.5 \times 10^7} \times 100$$

or

$$\frac{3\,999\,000}{65\,000\,000} \times 100$$

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= 6.15

*allow 6.15 with no working shown for **2** marks*
*allow for **1** mark for a calculation using either:*

$\frac{3.45 \times 10^6}{6.5 \times 10^7}$

or

$\frac{3\,450\,000}{65\,000\,000}$

or

$\frac{5.49 \times 10^5}{6.5 \times 10^7}$

or

$\frac{549\,000}{65\,000\,000}$

1

6.2

*allow 6.2 with no working shown for **3** marks*

1

*allow ecf from second step correctly rounded for **1** mark*

(d) could be other reasons for glucose in urine
or
blood test gives current / immediate result, urine levels might be several hours old
or
not always glucose in urine

1

(e) results not affected by glucose from food
or
8 hours is sufficient time for insulin to have acted on any glucose from food eaten
or
so that there is a low starting point to show the effect

1

(f) (patient **A**)

*no mark for identifying **A***

glucose level much higher (than **B**)

1

and remains high / does not fall

1

[15]

Q11.

(a) Too much thyroxine is released into the blood

1

which raises BMR

1

causing increase in formation of glycogen / lipids / proteins
or
increase in rate of respiration

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or
increase in breakdown of excess proteins

1

(b) FSH causes eggs to mature and stimulate ovaries to produce oestrogen

1

LH stimulates the egg to be released

1

(c) (missing a dose causes a) dip / drop in progesterone levels

1

(therefore) FSH is not inhibited anymore

1

(therefore) LH is not inhibited anymore

1

(and consequently) an egg is matured and released

allow (and consequently) an egg is available to be fertilised

1

[9]

Q12.

(a) (i) 2400 cm^3

1

(ii) 1400 (cm^3)

*allow **2** marks for ecf of correct answer to [answer given in (a)(i) – 1000]*

*allow **1** mark for 2400 – (600 + 400) or equivalent with no or incorrect answer*

*allow **1** mark for ecf of answer given in (a)(i) – 1000 or equivalent with no or incorrect answer*

2

(b) (i) sweat(ing)

allow evaporation

allow perspiration

1

(ii) any **one** from:

- for cooling
- to maintain body temperature

1

(c) (i) More water was lost through the skin.

1

(ii) decrease

1

[7]

Q13.

(a) (i) follicle stimulating hormone / FSH

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1

(ii) oestrogen

1

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

- to help them have a baby / get pregnant
  ignore to make them fertile
- to stimulate egg production / release / maturation
- own levels of FSH / LH / hormone (too) low
  allow to increase hormone / FSH / LH levels
  do not allow to increase oestrogen levels

1

(ii) through the bloodstream

1

(c) oestrogen

1

progesterone

1

[6]

Q14.

(a) ovary

1

(b) 46

1

(c) (i) does not fit the pattern
or
it is higher than the 3rd value / it should be lower than the 3rd value / it should be between the 3rd and 5th values
*do **not** allow use of incorrect figures*

1

(ii) As age increases % of women (having a baby) decreases

1

(d) (i) 33

$\frac{66}{2}$

allow 1 mark for $\frac{66}{2}$
if no answer / wrong answer

2

(ii) low success rate

1

more likely to have a baby with health problems / abnormalities / a faulty chromosome

1

[8]

Q15.

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(a) (i) The person started running a race.

1

(ii) 2300

1

(iii) drinking (water / sports drink)
or
through eating

1

(b) (i) brain

1

(ii) receptors

1

(c) cools us down
allow evaporates

1

[6]

Q16.

(a) (i) pancreas

1

(ii) Insulin causes glucose to move into cells.

1

(b) (i) **A**

1

rapid rise **or** fastest

1

(ii) 2

1

(c) The pancreas could be rejected.

1

[6]

Q17.

(a) immune system
allow white blood cells / lymphocytes
ignore phagocytes

1

produces antibodies

1

(which) attack the antigens on the transplanted organ / pancreas
*allow transplanted organs have foreign antigens at start of explanation **and** linked to attacking the organ*

1

(b) (i) change / rise detected by the sensor

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1

information used to calculate how much insulin she is going to need (bring her blood glucose back to normal)

1

(pump delivers) insulin into the blood

1

(causing) glucose to move into cells

allow (liver) converts glucose to glycogen

1

max 2 if no ref. to artificial pancreas

(ii) any **one** from:

- it is more accurate **or** less chance of human error
- (glucose) level will remain more stable **or** no big rises and falls in blood sugar levels
- you don't forget to test and / or inject insulin
- if ill or in coma insulin is still injected

ignore continuous and automatic unqualified

1

[8]

Q18.

(a) (i) chemical

1

(ii) pituitary gland

1

(b) 8

allow 9 or 10

1

(c) (i) any **four** from:

- progesterone starts being produced at 4 weeks / no progesterone before 4 weeks
- and then / from 4 weeks increases
- oestrogen at constant / low level (from 0) to 20 weeks
- and then / from 20 weeks increases
- from 20 − 36 weeks level of O rises more steeply than that of P

or

- P is always higher than 0 from 6 to 36 weeks

*if no other marks awarded, allow progesterone and oestrogen both increase / rise for **1** mark.*

4

(ii) oxytocin

1

level of oxytocin increases just before birth

1

[9]

Q19.

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(a) homeostasis

1

(b) in sequence:

pancreas

1

liver

1

glycogen

correct spelling only

1

glucagon

correct spelling only

1

(c) (i) broken down / digested

1

further detail eg into amino acids / by enzymes / by proteases

1

(ii) diet / eating less sugar / less fat

ignore balanced diet

or

ignore 'dieting' / slimming diet

exercise

accept pancreas transplant

1

(d) (i) sensible suggestion
eg (owner's) smell / sweating / change in owner's behaviour / dizziness / tiredness

1

(ii) any **five** from:

*allow **1** mark for justified conclusion*

*do not allow full marks unless at least **1** pro and **1** con.*

Pro:

- % below normal decreases
- % in normal increases
- reliable / repeatable / valid data as large number of samples

  do not allow accurate / precise
- patients express satisfaction.

Con:

- may not be reliable as blood glucose measurements for only 5 patients / survey of only 16 (dog owners)
- % above normal increases / dogs are less good at detecting high glucose.

5

(e) glucose in urine of diabetic (and not in the non-diabetic)

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1

urea and Na+ ions are similar in each / slightly lower in diabetic

1

+ any **three** from:

- no protein in either urine sample because protein too large / does not pass through filter
- glucose passes through filter in kidney

  ignore glucose is reabsorbed
- non-diabetic: the / all glucose is reabsorbed / taken back into blood
- diabetic: (too much glucose so) cannot all be reabsorbed
- because diabetic has high concentration of glucose in blood
- urea and Na+ lower in diabetic because less water is reabsorbed (due to extra glucose in filtrate).

3

[19]

Q20.

(a) Lung

1

(b) Filtering the blood

1

(c) They will take in water and burst

1

(d) (i) 6

1

(ii) less than 28

1

(iii) urea not reabsorbed
or
dialysis (fluid) has removed urea

1

(e) (i) antibodies

1

(ii) Tissue typing the donor kidney

1

[8]

Q21.

(a) (i) **B**

1

(ii) **D**

1

(iii) **C**

1

(b) (i) insulin

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1

(ii) pancreas

1

[5]

Q22.

(a) (i) has the least amount of glucose

*allow least amount of fat **or** no fat*

1

(to) transfer energy (for the run)

allow (to) release energy (for the run)

*do **not** allow produces energy*

*do **not** allow 'energy for respiration'*

1

(ii) any **one** from:

- cells will work inefficiently
- absorb too much water / swell / overhydrate
- lose too much water / shrink / dehydrate

ignore turgid / flaccid

cells burst is insufficient

allow cramp in muscle.

1

(b) any **three** from:

- thermoregulatory centre
- (has temperature) receptors
- (which) monitor blood temperature (as it flows through the brain)
- (temperature) receptors in the skin
- (receptors) send impulses to the brain

ignore vasoconstriction / vasodilation / sweating

allow hypothalamus

impulses sent to the thermoregulatory centre = 2 marks.

3

(c) (i) (sports drinks) contain a lot of glucose

1

(a person with diabetes) does not produce insulin **or** does not produce enough insulin

allow (person with diabetes) has cells which do not respond to insulin

*do **not** allow insulin produced by liver*

1

so blood glucose / sugar levels will rise too high **or** to a dangerous level

1

(ii) inject insulin

or

have an insulin pump (fitted)

*do **not** allow swallow insulin*

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accept exercise
accept inhale insulin
*accept take metformin **or** other correctly named drug*
allow pancreatic transplant

1

[10]

Q23.

(a) (the kidney) filters the blood
ignore refs to hormones and drugs

1

(and then) reabsorbs <u>all</u> of the glucose

1

reabsorbs some of the ions
allow salts
ignore minerals

1

reabsorbs some of the water

1

releases urea (in urine)

1

(b) (i) should fall from 28 (to the end of dialysis)
ignore any line drawn after end of dialysis
allow + / - 0.5 square
graph line must fall to / below
below 15

1

(ii) should stay level at about 6 throughout
ignore slight variations
allow + / - 1 square
ignore any line drawn after end of dialysis

1

(c) (i) immune system
allow white blood cells / lymphocytes

1

(produces) antibodies

1

(which) attack the antigens (on the transplanted kidney)
non-matching antigens insufficient

1

(ii) any **one** from:
- tissue typing (to find match)
- treating with drugs that suppress the immune system

accept treat with immunosuppressants.

1

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[11]

Q24.

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 <u>either</u> water loss or gain

[6]

Q25.

(a) (i) 3.0

accept 3

1

(ii) any **two** from:

- take in water
- take in ions / minerals / nutrients

accept salts / named ions

ignore food

- anchorage / support

2

(iii) asexual reproduction

1

(b) (i) a tropism

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1

(ii) if tip exposed / **A** – grows / bends towards light
*allow <u>tip</u> of **A** moves towards light*
*ignore **A** responds to light*
allow remained 'straight'

1

if tip covered / **B** – did not grow towards light / remained vertical
*ignore **B** does not respond to light*
ignore phototropism
*<u>only</u> **A** grows towards the light = 2 marks*

1

(c) (i) auxin

1

(ii) hormone comes from the tip

1

more on shady side / moves away from light
allow reference to right-hand side

1

stimulates growth

1

more growth on shady side (than on light side)
answer must be comparative
ignore phototropism
ignore cell division

1

[12]

Q26.

(a) (i) 400
*correct answer = **2** marks with or without working*
2600 – (1500 + 600 + 100)
or
2600 – 2200
*for **1** mark*

2

(ii) LHS: glucose
accept $C_6H_{12}O_6$ / C6H12O6 / sugar

1

RHS: carbon dioxide
accept CO_2 / CO2
*do **not** accept CO^2 / CO*

1

(iii) (sweat) increase

1

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(urine) decrease

1

(b) (i) 66.7 / 66.67 / $66\frac{2}{3}$ / $66.\dot{6}$ / 67

accept answers in range

*correct answer = **2** marks with **or** without working*

or

$\frac{20}{0.3}$ *for **1** mark*

or 66 / 66.6 / 66.66 / 66.6$\dot{7}$ / 67.0 for 1 mark

*(penalise excessive number of sig. figs. –**1** mark) (eg no more than 2 decimal places)*

2

(ii) reabsorption of water by the kidney

1

(iii) (protein) (too) big

1

cannot pass through filter / stays in blood / cannot enter kidney tubule

1

(glucose) small / can pass through filter

1

all taken back into blood / all reabsorbed

allow the glucose is reabsobed

1

(c) any **four** from:

- transplant is permanent / dialysis is repetitive treatment / dialysis only short term
- kidney works all the time / dialysis intermittent
- concentrations in blood kept (±) constant / substances build up in blood between dialysis sessions
- poisoning / damage to body by build-up of substances (with dialysis)
- danger of infection / damage to blood vessels by needles (with dialysis)
- risk of blood clots with dialysis or anticlotting drugs (can lead to blood loss)
- long term expense of dialysis / excessive use of health service resources
- social point – inconvenience of dialysis described – can eat or drink without constraint with transplant

4

[17]

Q27.

(a) (i) one form of a / one gene

*do **not** allow 'a type of gene'*

allow a mutation of a gene

1

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(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 / ¼ / 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

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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]

Q28.

(a) brain

in correct order only

1

blood

1

sweat

1

(b) (i) A

1

(ii) to replace ions lost (in sweat)

accept salts

allow named examples, eg. prevent cramps

1

(iii) any **one** from:

- there is too much glucose / sugar in the sports drink
- they shouldn't have too much glucose / blood sugar
- it would cause their blood glucose / sugar to rise (too high)

1

[6]

Q29.

(a) (i) (37C is the same as human) body temperature

1

(ii) any **one** from:

- urea
- glucose
- sodium

ignore water

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1

(iii) (as they are) small enough to pass through (the membrane)

allow because there is a high concentration in the fake blood and a low concentration in the water (so will diffuse across)

1

(iv) glucose

1

(b) any **two** from:

- don't have to go to hospital **or** done at home rather than hospital
- less effect on lifestyle / can be mobile
- always filtering urea out

  continuous is insufficient
- don't need a medical professional (to do it for you)

  allow takes a shorter time

  allow does not have to be connected to blood vessels

  ignore 'less painful'

2

[6]

Q30.

(a) (i) defence against **or** destroy pathogens / bacteria / viruses / microorganisms

*do **not** allow 'destroy disease'*
accept engulf pathogen / bacteria / viruses / microorganism

accept phagocytosis

accept produce antibodies / antitoxins

allow immune response

1

(ii) they are small fragments of cells

1

(b) liver

in this order only

1

kidney(s)

1

(c) any **two** from:

- that it doesn't cause an immune response **or** isn't rejected / damaged by white blood cells
- whether it is a long lasting material / doesn't decompose / corrode / inert
- if it is strong (to withstand pressure)
- it will open at the right pressure
- that it doesn't cause clotting
- that it doesn't leak **or** it prevents backflow
- non toxic

  ignore correct size

2

[6]

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Q31.

(a) (i) 1 hour 15 mins / 1.25 hours / 75 mins

allow 1:15

ignore 1.15 hours

1

(ii) increase in (core / body) temperature

ignore numbers

1

(due to an) increase in <u>respiration</u> **or** more <u>muscle</u> contraction

1

releasing energy (as a waste product)

allow produces 'heat'

*do **not** allow making energy*

1

skin temperature decreases

1

(because there is) sweating

1

(which) evaporates and cools the skin

ignore references to vasodilation or vasoconstriction

1

(iii) (there is) dilation of vessels (supplying skin capillaries)

allow vasodilation

allow blood vessels widen

ignore expand

*do **not** accept dilating capillaries or moving vessels*

1

(so) more blood flows (near skin) (surface) **or** blood is closer (to the skin)

ignore ref to heat

1

(c) pancreas detects (low) blood glucose

1

produces glucagon

*do **not** allow glucagon made in the liver*

1

(so) glycogen is converted to glucose

allow adrenaline released which increases conversion of glycogen to glucose

or

reduced insulin production so less glucose into cells / less glucose converted to glycogen

for 1 mark

1

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[12]

Q32.

(a) (i) skin

1

(ii) kidneys

accept kidney

1

(iii) lungs

accept lung

1

(b) (i) multiply temperature by number of students at that temperature and add them up

allow (36.8 5) + (36.9 3) + (37.0 6) + (37.1 7) + (37.2 3)

allow 888

1

divide by number of students

allow divide by 24

1

(ii) 10 / ten

1

(iii) so <u>enzymes</u> work (well)

ignore death / overheating / hypothermia

allow body <u>reactions</u> work (well)

1

[7]

Q33.

(a) (i) **A** – pituitary

allow hypothalamus

1

B – ovary / ovaries

1

(ii) in blood (stream)

accept in plasma

ignore dissolved

1

(b) (i) FSH and Luteinising Hormone (LH)

1

(ii) fertilised
OR
reference to sperm

1

form embryos / ball of cells or cell division

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1

(embryo) inserted into mother's womb / uterus

allow (fertilised egg) is inserted into mother's womb / uterus

1

(iii) any **one** from:

- multiple births lead to low birth weight
- multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages

allow premature

ignore reference to cost / ethics / population

1

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

- almost identical

allow S (slightly) more successful

- both approximately 20%

1

(ii) larger numbers (in clinic R) (in 2007)

allow only 98 (in S) (compared to 1004 (in R))

1

results likely to be more repeatable (in 2008)

allow more reliable

*do **not** accept more reproducible / accurate / precise*

1

[11]

Q34.

(a) pancreas

apply list principle

1

(b) (i) protein

apply list principle

1

(ii) any **one** from:

- (controlling / changing) diet

accept sugar(y foods) / named eg

ignore references to starch / fat / protein / fibre

- exercise

accept example, eg go for a run

- pancreas transplant

accept named drug eg metformin

1

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(c) (i) increase

ignore reference to women

1

then fall

1

relevant data quote (for male)

eg max at ages 65–74 ***or*** *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

accept quotes from scale eg '130' or '130 per thousand' but ***not*** *'130 thousand'; to within accuracy of +/- 2 (per thousand)*

1

(ii) (between 0 and 64) more females (than males) **or** less males (than females)

ignore numbers

allow eg females more diabetic than males

1

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

allow eg males more diabetic than females

1

[8]

Q35.

(a) Pancreas

allow phonetic spelling

1

(b) any **three** from:

max 2 *if any one process goes on in wrong organ*

- (amino acids) broken down
- (amino acids) form urea
- (amino acids broken down / converted **or** urea formed) in liver
- (urea / broken down amino acids) removed / filtered by kidney

  do ***not*** *allow amino acids filtered / removed by kidney*
- (urine / urea / broken down amino acids) stored / held in bladder

  do ***not*** *allow amino acids stored / held in bladder*

3

[4]

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