AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.3 HORMONAL COORDINATION IN HUMANS (PACK 6)

SCORE	PERCENTAGE
/257	%

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Q1.

(a) A

1

(b) D

1

(c) A = synapse

1

B = motor (neurone)

1

in this order only

(d) a reflex action

1

(e) 12 (ms)

1

0.012 (s)

1

*an answer of 0.012 (s) scores **2** marks*

(f) A

1

(g) controls the release of an egg

1

(h) in the blood(stream)

allow in the plasma / blood vessels
*do **not** accept in blood cells / platelets*

1

(i) (person) C

1

any **one** from:

- the testosterone level is high(er)

  allow testosterone is the main male (sex) hormone

- the oestrogen **and / or** progesterone levels are low

- the oestrogen and progesterone levels do not rise and fall as they do in a menstrual cycle

  allow there is no menstrual cycle

1

no marks if A or B given

[12]

Q2.

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(a) $\frac{33}{72}$

or

0.45833…

allow $\frac{34}{72}$

or

0.47222…

1

0.46 (arbitrary units per hour)

allow 0.47 (arbitrary units per hour)

*allow an answer given to 2 significant figures from an incorrect calculation in step 1 for **1** mark*

1

(b) any **five** from:

- (during the first days of the cycle) FSH from the pituitary stimulates an egg / follicle to mature
- FSH stimulates oestrogen from the ovaries
- oestrogen causes thickening of the uterus lining (in the first half of the cycle)
- oestrogen inhibits FSH but stimulates LH from the pituitary
- the high levels of LH stimulate release of the egg / ovulation (on day 14))
- progesterone is secreted by the (empty) follicle / corpus luteum (after day 14 / ovulation)
- progesterone maintains the lining of the uterus (during the second half of the cycle)
  or
  progesterone inhibits both FSH and LH
- progesterone falls (if no pregnancy happens) and uterus lining comes away as the menstrual blood flow

*if no other marks awarded allow **1** mark for oestrogen and progesterone are produced by the ovaries and FSH and LH are produced by the pituitary*

5

points must be in correct order to gain full credit

(c) any **one** from:

- (lower dose so) fewer side effects
- (patch lasts longer so) don't have to remember to take pill every day
- hormone (from patch) goes directly into bloodstream so (contraception) unaffected by vomiting

1

[8]

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Q3.

(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

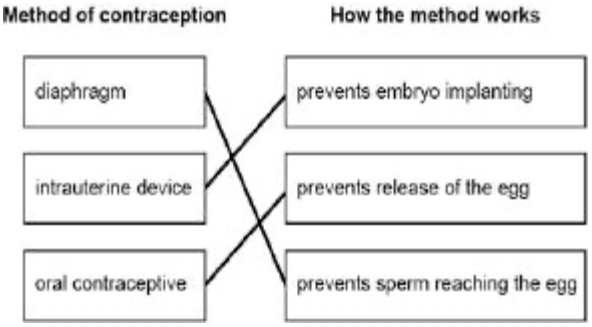
1

[10]

Q4.

(a)

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2

2 *marks for all 3 correct*
allow ***1*** *mark for 1 or 2 correct*

(b) to test for safety / toxicity
or
to test for dangerous / harmful side effects

ignore to test for side effects unqualified

1

(c) **Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

5–6

Level 2: Some logically linked reasons are given. There may also be a simple judgement.

3–4

Level 1: Relevant points are made. They are not logically linked.

1–2

No relevant content

0

Indicative content

allow converse where applicable
- condom effectiveness is lower than oral contraceptive and patch
- hormone patch slightly more effective than oral contraceptive
- all are highly effective
- condoms more easily accessible
- condoms have no serious side effects, oral contraceptive and patch have possible side effects
- only condoms protect against STIs / STDs or named STIs / STDs
- side effects don't affect all women
- could forget to take oral contraceptive, but patch is applied for long time
- could forget to replace patch
- patch is visible

ignore costs
ignore how the contraceptive works

[9]

Q5.

(a) all points plotted accurately

allow ± 0.5 small square tolerance
allow ***1*** *mark for 3 or 4 points plotted accurately*

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2

line of best fit drawn

1

(b) extrapolation on graph

1

9.5 (%)

allow value in range 9.4−9.6
allow correct reading from incorrect extrapolation

1

(c) any **one** from:

- eating habits may change
- people are more informed about the causes of diabetes
- change in exercise patterns

allow new cure

1

(d) any **two** from:

- diabetes (in the world) is increasing

allow low / high income countries are increasing

- diabetes in low-income countries is rising faster (than high-income / world)
- high-income countries and low-income countries were the same in 2010
- high-income countries have been higher than low-income but now / 2018 the situation is reversed
- diabetes in high-income countries was higher than the world total (from 1986 − 1993) but is now lower

allow correct use of data

2

(e) people are becoming more obese

1

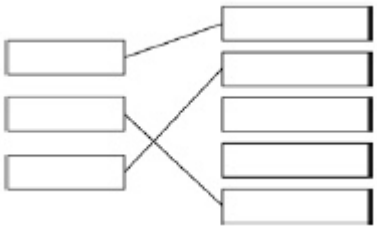
people are eating more sugar

1

[10]

Q6.

(a)



1
1
1

(b) 23%

*allow **1** mark for evidence of pill + condom = 180°/50%*

2

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(c) any **two** from:

- want to have a baby
- not having sex
- past the menopause
- pregnant

allow any sensible reason

2

(d)

Level 2: Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted.	3-4
Level 1: Relevant features are identified and differences noted.	1-2
No relevant content	0
Indicative content **combined pill** • **A** – easy to take, very effective and free on NHS, but • **D** – it can cause headaches/side effects, must remember to take it every day **condom** • **A** – only need it when you have sex, no side effects, very inexpensive, but • **D** – it is not as reliable, more difficult to use **sterilisation** • **A** – 100% effective but • **D** – probably will not be able to have a family, risks of surgery	

4

[11]

Q7.

(a) (hormonal uses chemicals / synthetic) hormones to prevent an egg being released

allow 'to prevent maturation of eggs'

1

(non-hormonal has a barrier which) prevents the sperm reaching an egg **or** prevents implantation

1

a correct example of each type

1

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(b) suitable scales and axes labels correct

1

all points plotted accurately

*allow **1** mark for 5 accurate points*

2

line of best fit

*allow a bar chart for max **3** marks*

1

(c) decrease egg production

1

by between 6–10 times

allow ecf from their graph

1

[9]

Q8.

(a) glucagon

correct spelling only

1

(b) if glucose too high (insulin causes) glucose to enter liver / muscle cells
or
glucose to be converted to glycogen

1

so blood glucose levels fall

1

when glucose gets too low (glucagon causes) glycogen breakdown in liver / muscle cells

allow ecf from part (a)

1

so glucose enters blood and raises level again

1

this is called negative feedback

1

(c) any **two** from:

- polymer
- made of two strands
- (twisted) in a double helix

allow:

- *backbone of strands contains sugar and phosphate groups*
- *(cross) linked by pairs of bases*
- *correct names of four bases or base pairs*

2

(d) contains a code

1

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for a sequence of amino acids which forms a specific protein

1

(e) mother **A** (polydactyly)

50% / half of children will have polydactyly if parent is heterozygous as it only takes one allele to show the disorder and half the sperm / ova / gametes will have faulty allele.

1

(and) all / 100% will have polydactyly if parent is homozygous as faulty gene will always be passed on

1

(but) for mother **B** (cystic fibrosis) none / 0% of children will have cystic fibrosis as it would need a second allele from the other parent before the disorder would be present

allow genetic diagram(s) if correct and offspring ratio clearly indicated.

1

[13]

Q9.

(a)

	Animalia
Phylum	
Class	
Genus	*Spodoptera*
Species	

1
1

(b) any **one** from:

- no / few natural predators
- no / few pathogens / diseases
- more favourable climate
- plentiful food as corn crops grown over wide areas in Africa

1

(c) any **one** from:

- compare the structural features with those of annelids and arthropods

  allow named structural features eg is it a segmented worm, does it form a pupa, does it turn into an adult with legs.
- carry out DNA analysis and compare with known annelids and arthropods
- carry out electron microscopy of internal parts to see fine structure and compare with known annelids and arthropods

1

(d)

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Level 2: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	3-4
Level 1: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	1-2
No relevant content	0
Indicative content **advantages** • killing worms will mean more corn / food for African people • so food security or no famine • it will stop the spread of the worms • so stop it reaching other countries and causing food shortages there • it will remove an invasive species • and so restore the natural ecosystem balance in the area **disadvantages** • insecticide will kill other (pollinating) insects • so will stop fertilisation of crops and lead to poor yields • insecticide will kill other insects • and upset the ecological balance in the area or reduce biodiversity in the area • insecticide may be toxic to humans • causing illness if they ingest it • insecticide may build up in the food chain • and poison / kill organisms further up the chain (ignore cost as it could be argued either way)	

4

[8]

Q10.

(a) hormone

ignore protein

1

(b) (once a certain amount of thyroxine has been produced)

(thyroxine) inhibits / prevents / stops (pituitary gland from) stimulation of the thyroid gland

1

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so less thyroxine is produced

1

(c) cold weather stimulates the pituitary gland, which stimulates the thyroid gland to produce more thyroxine

1

increased / more thyroxine raises basal metabolic rate

1

which increases rate of respiration, which increases body temperature

1

(d) less stimulation of thyroid gland, so less thyroxine produced / released

1

so basal metabolic rate decreases

1

therefore reduced respiration rate, so more food stored as fat

1

[9]

Q11.

(a) maintains the lining of the uterus

1

suppresses FSH

1

(b) (sudden) drop in progesterone

1

causes the lining of the uterus to break away

1

(c) FSH (injections) stimulate the growth / maturation of eggs (to be fertilised)

1

FSH stimulates oestrogen release

1

(which) stimulates uterus lining to develop (for the fertilised egg to implant into)

allow oestrogen stimulates LH production / release

1

LH stimulates ovulation / egg release

1

[8]

Q12.

(a) scales drawn

should use more than50% of the graph paper

1

all five points plotted

allow ±0.5 small square tolerance

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*allow **1** mark for 3 or 4 points plotted accurately*

2

line of best fit drawn

1

(b) the higher the concentration of glucose the darker the blue compound that is formed

1

the blue compound absorbs the light

1

(c) 0.13

allow 0.12

allow ecf from graph drawn in part (a)

1

(d) increase in blood glucose detected by the pancreas

1

insulin is released from the pancreas

1

glucose would move into cells

1

glucose converted to glycogen (for storage) in the liver

1

(e) glycogen isn't converted to glucose

1

therefore more glucose isn't released into the bloodstream

1

(f) pancreas

or

bone marrow

*do **not** accept embryo*

allow other correct sources of stem cells

1

(g) any **three** from:

- would not need to inject insulin
- continuous control
- would not need to test blood glucose levels (via blood tests)
- won't need to monitor carbohydrate intake
- no risk of forgetting to inject insulin

3

(h) any **two** from:

- fear that the cells could become cancerous
- possible transmission of other disease
- may form other types of cell

2

[19]

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Q13.

(a) any **two** from:

- same result at pH 7 and 7.5
  or
  could be any pH between 7 and 7.5
  or
  not tested at pH 7.25
  or
  need to test at smaller pH intervals (between 7 and 7.5)
- accuracy of result only to nearest 0.5 minutes
- no repeats
- difficult to determine end point (colour)

2

(b) 2.7 / 5

1

0.54 (units per minute)

*allow 0.52 with no working shown for **2** marks*

1

*allow **1** mark for 0.52 **or** 0.56*

(c) (after 10 minutes) solution goes black

1

(after 60 minutes) solution stays the same
or
does not go black
or
goes slightly orange

1

(d) steeper curve

1

levels off at 11.8 units **and** before 45 minutes

1

(e) no / little sugar produced

allow a correct description of what the graph would look like

1

(because at 65 °C) the enzyme will be denatured

allow (because) the enzyme's shape will be changed

or

(because) the active site is damaged

1

(so) will no longer fit the starch
or
(so) will not be able to catalyse the reaction

1

[11]

Q14.

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(a) pancreas

1

(b) (in the) blood(stream)

allow in the (blood) plasma

1

*ignore dissolved **or** in solution*

(c) any **two** from:

- concentration rises and falls in both people
- concentration is higher at start / always in person with diabetes
- concentration rises higher in person with diabetes

allow correct use of figures

2

plus any **two** from:

- concentration rises more rapidly in person with diabetes
- concentration stays high for longer in person with diabetes
- concentration does not return to starting level during test in person with diabetes,
  yet concentration returns to starting concentration by 90 minutes in person without diabetes
- concentration goes below starting concentration only in person without diabetes

2

(d) reduce carbohydrate / glucose / sugar in diet

1

(so) blood glucose concentration does not increase as much

1

(so) there is reduced named effect (of prolonged high blood glucose)

allow reduced short or long term consequences such as tiredness

or

increase urination

or

thirst

***or** eye / kidney / nerve / heart disease*

1

[9]

Q15.

(a) (76 − 28) × 2

1

96 (units / h)

*allow 96 (units / h) with no working shown for **2** marks*

1

*allow 1.6 units / min for **1** mark*

allow answer in range of 94–104

*(units / h) for **1** mark*

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(b) increased blood glucose concentration causes insulin release from pancreas

1

which stimulates cells to absorb glucose / sugar from the blood, so blood glucose concentration decreases

1

(c) any **three** from:

*at least one advantage **and** one disadvantage of the system(s) must be given for full marks*

allow responses phrased in terms of the meter and injection systems

advantages of the new system:

- better control so reduces risk of future health problems
  allow fewer low / high blood glucose periods so safer
- no need to estimate dose of insulin
- less chance of giving too much / little insulin
- system works automatically / continuously so no need to test / inject

disadvantages of the new system:

- system is always attached so may restrict activities
  allow pump is difficult to hide
- pump has to be carried somewhere
  allow risk of discomfort
- pump will need re-filling
- risk of infection

or

risk of tissue damage (at injection site)

- line might come out
  accept new system more expensive

3

qualified conclusion: a statement as to which system is better with reference to at least
one advantage and one disadvantage

for example, the new system is better because although it is more expensive, it works automatically

1

(d) blood glucose concentration goes too low

1

blood glucose concentration detected by pancreas

1

pancreas releases <u>glucagon</u>

1

(glucagon causes) cells to convert to glycogen into glucose

1

glucose released into blood

1

[13]

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Q16.

(a) Pituitary

1

(b) $\frac{10-4}{4}$ **or** $\frac{6}{4}$

1

= 150 (%)

1

(c) the level in the blood is already higher than it was before point **A**

1

levels hadn't returned to normal yet (before the next scare)

allow he had already been scared so he was expecting the second scare

1

(d) increased oxygen to brain / muscles

1

increased glucose to brain / muscles

1

[7]

Q17.

(a) **A** FSH

allow follicle stimulating hormone

1

B Progesterone

1

(b) LH peaks

allow luteinising hormone

1

which causes an egg to be released.

1

(c) **Level 3 (5–6 marks):**
A detailed and coherent explanation is given, which logically links the role of different hormones to their use in IVF and a clear explanation of how IVF increases the chance of
a successful pregnancy.

Level 2 (3–4 marks):
An attempt is made to link the role of hormones to their use in IVF. The logic used in explaining how IVF increases the chance of a successful pregnancy may not be clear or linked to the hormones.

Level 1 (1–2 marks):
Discrete relevant points made. The logic may be unclear and links may not be made.

0 marks:

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No relevant content

Indicative content

Identification of hormones used in IVF:
- FSH
- LH.

Role of hormones in IVF:
- FSH causes eggs to mature
- LH causes the eggs to be released.

Effect on chance of successful pregnancy:
- high levels of hormones cause many eggs to be matured and released
- sperm and eggs are collected and eggs are fertilised (so increased probability of fertilisation)
- fertilised eggs are given time to develop into a small ball of cells
- some are transferred into the mother (uterus), to increase the probability of one successfully implanting.

6

[10]

Q18.

(a) in the blood(stream)

allow plasma

ignore dissolved or in solution

1

(b) all three plots correct

*accept two correct plots for **1** mark*

2

suitable line drawn

1

(c) 1 hour

1

(d) 230−185

identification of steepest part of graph and correct readings taken

1

= 45

1

(e) line on graph showing extrapolation for person **B**

correct value read from graph (at 130 mg per 100 cm^3)

*allow **1** mark for a value of 4.5–5 hours if no extrapolation shown*

2

[9]

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Q19.

(a) products below reactants

1

correct energy profile

1

activation energy correctly labelled

1

energy given out correctly labelled

1

(b) 31 (%)

1

(c) the products would be above the reactants

1

(d) catalysts increase rate of reaction

1 *mark for each property*

1 *mark for each explanation*

so products formed in less time

or

catalysts lower activation energy

explanation must be linked correctly to the property to gain the mark

so lowers energy requirements

or

catalysts not used up in the reaction

so only an initial outlay needed

or

only a small amount of catalyst needed

so small initial cost

max. 4

(e) Protein

1

(f) high temperatures

1

extremes of pH

1

(g) lactase acts as the lock, lactose is the key (substrate)

1

lactase has an active site which will only fit lactose molecules

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1

so lactase will not work with other molecules

1

[16]

Q20.

(a) 6.1 circled on table (15 °C, test 1)

1

(b) 1.8

do not allow 1.83

1

(c) 16 (minutes)

correct number extrapolated from curve

1

(d) 4.0 min – blue / black / purple

1

7.0 min – yellow / orange / brown

1

(e) The amylase solution had been prepared with water at 95 °C

1

(f) **Level 3 (5–6 marks):**
A clear and coherent method is described using logical steps and demonstrating a good understanding of how to improve the validity of the method. The method would lead to
the production of valid results that would give rise to a more valid conclusion.

Level 2 (3–4 marks):
The substantive content of a method is present and demonstrates reasonable understanding of how to improve the validity but may be missing some detail. The plan
may not be in a completely logical sequence but leads towards the measurement of rate of the reaction.

Level 1 (1–2 marks):
Simple relevant statements made, which demonstrate limited understanding of how to improve the experimental method. The response lacks logical structure and would not
lead to the production of valid results or a more precise optimum temperature.

0 marks:
No relevant content

Indicative content

- conduct at a greater range of temperatures
- use temperatures both above and below 40 °C
- use smaller temperature intervals to get a more accurate optimum (eg go
  up in 2 °C increments)
- take samples at smaller time intervals to get a more accurate result for

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'time taken'

- control the volume of starch used (eg 5 cm^3)
- control the volume of the amylase solution (eg 1 cm^3)
- control the temperature (eg using a water bath)
- heat the two solutions separately before mixing
- control the concentration of the starch solution
- control the concentration of the amylase solution

6

[13]

Q76.

(a) any **four** from:

- the woman is given FSH / LH

  allow fertility drug

  *do **not** allow an incorrect hormone eg oestrogen*
- (FSH / LH / hormones) to stimulate egg maturation / release / production
- eggs **and** sperm are collected / mixed
- fertilisation happens
- embryo(s) form
- (embryo(s)) inserted into the woman's uterus / womb.

  *this complete statement gains **2** marks*

4

(b) **three** arguments given from:

*arguments for **and** against required for full marks*

Arguments for:

- older women (may) have more money / time to support the child
- older women may make better parents

  allow examples of maturity / life experiences
- allows women who have late marriage / partnership to have a family.

Arguments against:

- mother may die before child has grown up
- baby may not be as healthy

  allow (higher) risk of genetic disorders / down's syndrome
- mother may have more problems during pregnancy / birth
- mother might have less energy (than a younger mother) to look after a child.

3

[7]

Q77.

hormones

words must be in correct order

1

glands

1

blood

1

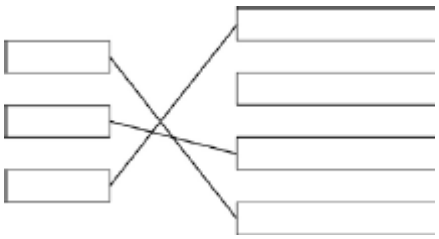
LH

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1

[4]

Q78.



extra lines negate mark(s)

[3]

Q79.

(a) oestrogen

in either order

allow phonetic spellings

1

progesterone

accept progestin / progestogen

*do **not** allow proestrogen*

1

(b) (oestrogen / progesterone) inhibits FSH production

if no hormones mentioned credit any effect listed in mark scheme

1

(so) no eggs mature

ignore for oestrogen: no eggs mature

*do **not** accept oestrogen*

inhibits ovulation

accept (progesterone) thickens mucus around cervix

or

inhibits maturation / ovulation of egg

1

[4]

Q80.

(a) ovary

1

sperm

1

uterus

1

must be in correct order

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accept phonetic spelling – see marking guidance 3.6

(b) (i) more embryos transferred in older women / average increases with age

ignore chance of pregnancy / number of treatments

1

(ii) *answer must relate to data in table*

(many) embryos die / destroyed / do not survive

allow low success rate / often does not work

allow could lead to multiple births

ignore less successful in older women

ignore older women should not have babies

ignore not natural / finance

ignore religion / 'against God's will'

1

[5]

Q81.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on the marking guidance (see Reference Material), 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 the evidence for or against the newspaper's claim, including either evidence for or evidence against.

Level 2 (3-4 marks)
There is a description of some of the evidence for and evidence against the newspaper's claim, with at least one example of evidence for and one example of evidence against. There is an attempt at a conclusion.

Level 3 (5-6 marks)
There is a clear and detailed description of the evidence for and evidence against the newspaper's claim, with at least one example for and at least two examples against. A reasoned conclusion is given. The description must include reference to polyphenols.

Examples of the chemistry points made in the response

Evidence supporting the newspaper claim:

- the study included a control group / one group given a placebo
- all participants ate the same amount of chocolate each day
- results showed a decrease in total cholesterol / an increase in 'good' cholesterol / a decrease in 'bad' cholesterol in the group that ate the dark chocolate

allow (dark) chocolate worked / reduced (risk of) heart disease

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Evidence against the newspaper claim:

- no results given for (dark) chocolate without polyphenols
- only type 2 diabetes patients tested
- small sample tested / only 12 tested
- unequal numbers of males and females
- other health issues / age not controlled
- rest of diet not controlled
- chocolate contains high levels of fat / sugar / could cause other health issues eg weight gain
- long term effects not known / trial only 16 weeks

Argued conclusion made with an attempted justification

[6]

Q82.

(a) *allow lower case*
answers can be in either order

FSH

accept follicle stimulating hormone
ignore FHS

1

LH

accept luteinising hormone
*do **not** accept oestrogen / progesterone*

1

(b) (i) the older the woman, the less successful the treatment
OWTTE
relationship needed to obtain mark

1

(ii) *answer must relate to data in table*

(many) embryos die / destroyed / do not survive
allow low success rate / often does not work
allow could lead to multiple births
ignore older women should not have babies
ignore not natural / finance
ignore religion / 'against God's will'

1

[4]

Q83.

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(a) progesterone

1

fewer / less side effects

allow named side effect

eg less chance of nausea / headaches / blood clots / high blood pressure

second mark only awarded if correct hormone given

if no hormone given second mark can be awarded

1

(b) (sharp / sudden / large) temperature increase

allow correct figures

eg 36.4–37.6 / 37.8

1

(when) LH peaks / is high

allow peak of FSH / oestrogen / hormones

1

LH / luteinising hormone causes ovulation / egg release

1

(therefore) high chance of egg being there to be fertilised

1

[6]

Q84.

(a) ovary

1

(b) womb / uterus

1

(c) fertility

1

(d) by the blood system

1

[4]

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Q1.

(a) 98% of students were able to identify the cell nucleus from the sensory neurone

(b) 50% of students were able to identify the receptor.

(c) Students had to label the synapse and the motor neurone on the nerve pathway. On many scripts seen (13%) there was no attempt to label either part. Where a part was correctly identified it was occasionally the motor neurone. Synapse was very rarely seen. 9% of students achieved both marks.

(d) 91% of students were able to identify that the action described was a reflex action.

(e) Students were asked to read two values, in milliseconds, from a table and subtract them to give the difference in muscle contraction time between an old and a young person. An answer in seconds was required. 72% of students achieved one mark from an answer of '12'. 3% of students managed to successfully convert milliseconds into seconds, to arrive at a value of 0.012s.

(f) The position of the pituitary gland was correctly located by 35% of students.

(g) The most common misconception for the function of LH was to control blood glucose concentration. 32% of students knew that it controlled the release of an egg.

(h) This question was generally well answered with 57% of students identifying the bloodstream. However, many students thought that LH travelled via the nervous system, digestive system or in blood cells which was not creditworthy.

(i) Overall 80% of students were able to identify person C as the 18-year-old boy from three graphs showing the relative levels of sex hormones. Students usually gave the correct reason of there being a high level of testosterone, although some stated the low amounts of oestrogen / progesterone.

Often students failed to gain the mark because they made statements such as 'only males produce testosterone', or 'only females produce oestrogen'. Those who did not achieve the second mark often made vague statements referring to hormones rather than naming the specific hormones.

Q2.

(a) There were 16% correct responses to this question, achieved by reading correctly from the graph, followed by correct calculation and rounding.

However, a significant proportion of students misread the graph and so started with the wrong data. One mark was often achieved for giving their answer correct to two significant figures.

A large number of students did not to the rise in concentration of LH by time, although 'units per hour' was shown on the answer line. Many attempted to divide by days or minutes. Students also carried out the inverse calculation or tried to calculate percentage change.

(b) 10% of students gave excellent, clearly set out responses gaining four or five marks. These students demonstrated that they had understood and learnt the quite difficult

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interactions of hormones during the menstrual cycle. On the other hand, many students wrote confused accounts or simply describing the levels from the graph, so this question discriminated well.

A number of students referred to the pancreas as the site of production for some hormones while others did not gain because they referred to the 'master gland' rather than the pituitary. Some answers did not relate to the menstrual cycle. These students may have only read the second part of the question, name where each hormone is produced, for which they listed as many as they could, including testes and testosterone, pancreas and insulin, adrenalin and adrenal glands, thyroid and thyroxine.

The compensation mark was awarded in a number of cases, although there were many who gave the location of the hormones as the pancreas, or got all but one correct. 51% of students did not achieve any marks.

(c) This question was not well answered with 'not having to remember to take the pill every day' being the most frequent correct response. There were many insufficient responses about it being more effective, longer lasting or being safer.

There was some confusion regarding how both patch and pill are used. Some students thought the patch was placed inside the vagina, in the mouth or on ovary. Others thought that it would reduce the risk of STDs, or that it is easy to remove if you want to get pregnant.

Q3.

(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.

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Q4.

Foundation

(a) 80% of students could link one or two methods of contraception to how it works, but few could correctly link all three methods.

(b) 32% of students could describe that a low dose of a new drug would be given because there may be harmful side effects.

(c) This was an ‘extended response’ question, asking students to evaluate the use of three contraceptive methods. Students should know that marks will not be awarded for repeating information given in the question. Evaluate means students should use the information supplied, as well as their knowledge and understanding, to consider evidence for and against. Guidance regarding command words can be obtained from the AQA website.

Some students misinterpreted the percentages in the table as referring to the percentage use of each method of contraception. The strongest answers evaluated aspects from the table, and students' own knowledge, such as prevention of sexually transmitted infections.

60% of students were able to give level 2 or level 3 answers.

Higher

(a) 44% of students could correctly link three methods of contraception to how the method works.

(b) 44% of students could describe that a low dose of a new drug would be given because there may be harmful side effects.

(c) This was an ‘extended response question’, asking students to evaluate the use of three contraceptive methods. Students should know that marks will not be awarded for repeating information given in the question. Evaluate means students should use the information supplied, as well as their knowledge and understanding, to consider evidence for and against. Guidance regarding command words can be obtained from the AQA website.

Some students misinterpreted the percentages in the table as referring to the percentage use of each method of contraception. The strongest answers evaluated aspects from the table, and students' own knowledge, such as prevention of sexually transmitted infections.

91% of students were able to give level 2 or level 3 answers. 5% of students achieved full marks.

Q5.

(a) Students answered this question well with 48% achieving full marks. A large number of students did not work out the correct scale, therefore two or more points were plotted incorrectly. Lines of best fit were generally well drawn unless the student had decided to join the points with straight lines. 18% of students gained no marks here.

(b) Quite a few students extrapolated the wrong line. Some didn’t extrapolate at all but still got the right answer, therefore, they lost the mark for extrapolation but gained one mark for the final correct answer. Many also gained the second mark for correctly reading off an answer for 2020 after having extrapolated the wrong line.

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56% of students achieved one or two marks.

(c) Correct answers most commonly related to a change in eating habits. 'Sugar tax' was only credited if students went on to say that people would thus eat less sugar in their diets.

(d) 63% of students achieved at least one mark. The first marking point for rising cases of diabetes was seen most often. If an answer was made in terms of income or population increase no credit was gained.

(e) 73% of students were able to identify why the percentage of people in the world with diabetes has changed (gone up) from the graph.

Q76.

(a) At this level correct terminology was important. There were some very good responses seen that included all aspects of IVF treatment. The most common marks awarded were for mention of the eggs and sperm being mixed together, and for fertilisation happening. A few did not know what the embryo was called and said that the fertilised egg, foetus or baby was placed in the womb. Some referred to incorrect hormones, such as progesterone and oestrogen, so could not gain the first marking point. Some confused IVF with adult cell cloning.

(b) As in most evaluation type questions, in order to gain full marks references to arguments for and against were needed. Students found it more difficult to give arguments for older women having IVF treatment, than to give arguments against it. Many statements given as advantages were not credited as they were too vague. For example, many went down the route of 'it's their choice' or 'everyone has the right to have a child'. Quite a lot gained a mark for an argument against IVF in older women being that they might die before the child grows up, or that there might be problems during birth. Vague ideas that the woman would be 'too weak' were ignored. A few referred to the increased risk of Down's syndrome, which was equivalent to 'the baby might not be as healthy'.

Q77.

Most students knew that the chemical substances that control many body processes are hormones and some knew they were released by glands and transported in the blood. For the last marking point most wrote FSH or LH, rather than the other words, suggesting that they realised a hormone was required.

Q78.

More than two thirds of the students gained at least 1 mark, but many confused the functions of LH and FSH

Q79.

(a) Just over half of the students gained 1 mark for giving a correct hormone used in contraceptive pills. This was usually for oestrogen. Some gave a list of more than two hormones. If three hormones were listed, one of which was incorrect, 1 mark was negated. If two things are asked for in a question it is always best to only mention two things.

(b) A few students demonstrated a sound understanding of the effects of both oestrogen and progesterone. The specification does not demand any knowledge of progesterone, other than that it is used in some contraceptive pills, and

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progesterone only pills lead to fewer side effects; however any correct effects of progesterone were accepted. The expected response was that oestrogen inhibits FSH production so no eggs mature. Many answers said the woman's body was tricked into thinking it was pregnant, which was insufficient. Others thought it stopped fertilisation or killed fertilised eggs. Some students included several sex hormones in their response and demonstrated a misunderstanding of the effects of the individual hormones.

Q80.

(a) Students scored well but sometimes mixed up ovary and uterus. A few thought that embryos were inserted into the pituitary gland.

(b) (i) Many students were confused by other data in the table, referring to the number of treatments or to the percentage of successful pregnancies rather than number of embryos transferred. A significant number of students attempted to explain the effect of age on fertility. As the question asked how one factor affected another, a relationship was needed. Writing 'it increases' would not score without reference to the changing age of women. About half of students were able to obtain this mark.

(ii) Many unacceptable responses referred to vague ideas of ethical issues, such as 'some people don't like it' and the common 'it's against their religion'. Some students incorrectly referred to selecting characteristics during IVF and others thought it would not be their baby. Some students believe 'older women can't care for children'. Generally, there is a good understanding of the high cost of IVF treatment, but few who discussed this elaborated in enough detail to link this with the chances of successful treatment. Some students described data not directly linked with the question, for example 'more embryos transferred in older women' without going on to explain why this is an ethical issue.

Q81.

In this question students were assessed on their ability to evaluate an investigation. They were also assessed on QWC - their ability to use good English, organise information and use appropriate specialist terms. Significant numbers of students lost at least one mark by not observing the QWC criteria.

To attain level 3 (5-6 marks), students needed to include evidence supporting the newspaper's claim, evidence that did not support the claim and to give a reasoned conclusion. They were also required to make an appropriate reference to the presence or absence of polyphenols in the chocolate. A few Foundation Tier students did give Level 3 responses.

Most Foundation Tier students gave Level 1 or 2 responses. Many responses included at least one piece of evidence supporting the claim and one piece of evidence not supporting the claim, with many also attempting to give a conclusion. However, many students only argued their case from one side so were limited to Level 1.

Generally the question was well attempted, but simply copying the text did not gain credit.

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Q82.

(a) Although many students correctly gave FSH and LH, there was an overall impression that many students chose any two of the four hormones named in the specification.

(b) (i) Most students described the correct pattern but a small number of students were confused by other data in the table, referring to the number of treatments or to the number of embryos transferred, rather than percentage successful pregnancies.

(ii) Many unacceptable responses answers referred to vague ideas of ethical issues, such as ‘some people don’t like it’ and the common ‘it’s against their religion’. Some students incorrectly referred to selecting characteristics during IVF. Some students believe ‘older women can’t care for children’. There is a general good understanding of the high cost of IVF treatment, but few who discussed this elaborated in enough detail to link this with the chances of successful treatment. Some students described data not directly linked with the question, for example, ‘more embryos transferred in older women’, without going on to explain why this is an ethical issue.

Q83.

(a) Very few students gained full marks. A variety of incorrect hormones were given ranging from testosterone to LH and FSH. Many students did not realise that birth control pills are used to prevent pregnancy and gave advantages of maturing more eggs or increasing fertility.

(b) Students are not clear about the roles of the various hormones in the menstrual cycle. A number of students gained the second marking point for saying the concentration of hormones was high, but did not state that LH causes egg release. A reference to the sudden increase in body temperature was sometimes mentioned, but often vague descriptions of temperature changes throughout the cycle were given. The question told students to use information from both graphs but many responses only referred to Graph 1 and hormone concentrations.

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