Mark schemes

1 (a) liver

1

(b) insulin

*do **not** accept glucagon*

1

(c) kidney

1

(d) to replace water / ions / salt

1

(that is) lost in sweat

1

[5]

2 (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
- 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]

3 (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

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

= 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

$$\frac{5.49 \times 10^6}{6.5 \times 10^7}$$

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]

4 (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
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]

5 (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]

6 (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)

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]

7

(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]

8

(a) (i) **B**

1

(ii) **D**

1

(iii) **C**

1

(b) (i) insulin

1

(ii) pancreas

1

[5]

9 (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 <u>blood</u> 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*

accept exercise

accept inhale insulin

*accept take metformin **or** other correctly named drug*

allow pancreatic transplant

1

[10]

10 (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

[11]

11 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]

12 (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

1

(ii) if tip exposed / **A** – grows / bends towards light

*allow tip 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

*only **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]

13 (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

(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]

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

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

allow a mutation of a gene

1

(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

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]

15 (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]

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

1

(ii) any **one** from:

- urea
- glucose
- sodium

ignore water

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]

17 (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]

18 (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 respiration **or** more muscle 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

[12]

19 (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]

20 (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

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]

21 (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

(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]

22 (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]**

23 (a) (i) water

1

(ii) small

1

(iii) 3.15

1

(b) (i) 21 000

1

(ii) 2 years

1

(iii) prevent rejection

1 **[6]**

24 (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 RBC bursts

1

Haemoglobin is small enough to pass through filter

or haemoglobin diameter < pore diameter

1

[8]

25

(a) any **six** from:

- hormone(s) / named produced by pancreas
- if blood glucose levels are too high, insulin is produced / released
- allowing glucose to move from the blood into the cells / named eg liver
- glucose is converted to glycogen
- if blood glucose levels fall, glucagon is produced / released
- glycogen is converted to glucose
- causing glucose to be released into the blood

6

(b) diabetes that occurs when the body (cells) do not respond / are less responsive to insulin

1

(c) (i) higher BMIs due to <u>increase</u> in mass / weight (relative to height) / obesity

1

obesity / being overweight / being fat is a (significant) <u>risk factor</u> for Type 2 diabetes

allow causes Type 2 diabetes

1

(ii) any **three** from:

- related to <u>described</u> change in diet eg fast foods
- and less exercise
- which increases the chance of obesity / increases BMI
- increased awareness has helped to slow the increase

3

[12]

26

(a) (i) <u>rate of</u> chemical reaction<u>s</u> (in the body)

1

(ii) any **two** from:

- heredity / inheritance / genetics
- proportion of muscle to fat **or** (body) mass
  allow (body) weight / BMI
- age / growth rate
- gender
  accept hormone balance or environmental temperature
  ignore exercise / activity

2

(b) (i) 77

*correct answer with or without working gains **2** marks*
*allow **1** mark for 70 / 56 **or** 1.25 **or** 5*

2

(ii) increase exercise

accept a way of increasing exercise

1

reduce food intake

accept examples such as eat less fat / sugar
*allow go on a diet **or** take in fewer calories*
ignore lose weight
ignore medical treatments such as gastric band / liposuction

1

[7]

27 (a) (i) kidney

1

(ii) bladder

1

(iii) liver

1

(iv) lung(s)

1

(v) skin

1

(b) (i) 3000

allow 2970 to 3030
*correct answer gains **2** marks with or without working*
*if answer incorrect allow **1** mark for evidence of 1550 + 450 + 1000*
(allow tolerance of + or – ½ square on each)

2

(ii) 1600

allow 1570 to 1630

1

(iii) 1400

allow (b)(i) – (b)(ii)

1

(iv) correct plot from (b)(iii)

tolerance ½ square ignore width

1

(v) cells swell / overhydrated / damaged

accept poisoned (by urea)

1

[11]

28 (a) pancreas

allow phonetic spelling

1

(b) (i) A

1

shortest / quicker time (to work)

1

(ii) D

1

acts for longest time

mark dependent on D

allow D will last until 09.00 / breakfast / 24 hours

1

(iii) diet / exercise

if 'diet' is qualified, then will need correct qualification, e.g. 'less carbohydrate / sugar'

accept pancreas transplant / stem cell treatment

1

[6]

29 (a) (concentration high) in the hepatic portal vein is blood with glucose absorbed from the intestine

1

concentration is lower in the hepatic vein because insulin

1

(has caused) glucose to be converted into glycogen

1

or

allows glucose into liver cells

(b) (i) (after 6 hours) most of the glucose has been absorbed from the intestine **or** from food into the blood

1

(ii) because glucagon (made in the pancreas) causes

if biological terms incorrectly spelt they must be phonetically accurate

*do **not** accept glucagon made / produced by the liver*

1

glycogen to be converted into glucose

1

glucose released into blood

allow the liver maintains the correct / constant level of glucose in the blood

1

[7]

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

- chemical messenger / message
  allow substance / material which is a messenger
- chemical / substance produced by a gland
  allow material produced by a gland
- chemical / substance transported to / acting on a target organ
- chemical / substance that controls body functions

1

(ii) gland / named endocrine gland

brain alone is insufficient

allow phonetic spelling

1

(iii) in blood / plasma **or** circulatory system **or** bloodstream

accept blood vessels / named

*do **not** accept blood cells / named*

1

(b) *each hormone must be linked to correct action*
apply list principle
ignore the gland producing hormone

FSH stimulates oestrogen (production) / egg maturation / egg ripening

ignore production / development of egg

1

oestrogen inhibits FSH

allow oestrogen stimulates LH / build up of uterine lining

1

LH stimulates egg / ovum release / ovulation

accept LH inhibits oestrogen
accept LH controls / stimulates growth of corpus luteum
ignore production of egg

1

[6]

31 any **three** from:

*max **2** if only advantages **or** only disadvantages discussed*
ignore 'side effects' unqualified
ignore side effects produced by hormones

advantages of IUCD over pill eg

- can't forget to take it / have to take pill every day
  *do **not** allow last 5 years unless qualified*
- effect much longer than pill
- more effective in preventing pregnancy
  *do **not** allow reference to figures unless qualified*
- stops sperm entering uterus

disadvantages of IUCD over pill eg

- pain / uncomfortable / risk of infection / may damage uterus
- prevents fertilised egg developing / 'embryo rights'
  allow kills embryo
- needs replacement by doctor / nurse / professional
  or access to IUCD is more difficult than pill
  or IUCD is harder to come off than pill

3

argued conclusion

*must include a preference and a reference to **both** advantages and disadvantages*
***or** one is better in a given situation but the other is better in a different situation*

1

[4]

32 (a) B

1

less / no insulin (produced) **or** insulin produced in pancreas

allow pancreas can't monitor (blood) sugar (level)
ignore pancreas can't control (blood) sugar (level)
allow increased glucagon production
*allow A as liver stores less glucose / sugar for **2** marks only*

1

(b) (i) (it / protein / insulin) digested / broken down

if ref to specific enzyme must be correct (protease / pepsin)
ignore denatured
*do **not** accept digested in mouth / other incorrect organs*

1

(ii) any **two** from:

ignore injections

- (attention to) diet

*accept examples, eg eat less sugar(y food) **or** eat small regular meals*
allow eat less carbohydrate / control diet
ignore cholesterol or balanced / healthy diet

- exercise

ignore keep fit / healthy

- (pancreas) transplant / stem cells / genetic engineering

2

[5]

33 (a) (i) (too) big

1

cannot fit / pass through filter / through (pores) in membrane / cannot be filtered

*too big to be filtered = **2** marks*

1

(ii) water

1

(iii) partially permeable

1

(b) any **two** from:

- hazards of operation / named eg
- may be rejected **or** need to use immunosuppressant drugs / long term drug use **or** transplant may need to be replaced
- susceptible to other infections
- shortage of donors
- high <u>initial</u> cost

2

[6]

34 (a) <u>person with muscle disease:</u>

allow reverse argument for healthy person

any **three** from:

NB all points are comparative except peak (point 3)

*allow use of **two** approximate figures as a comparison*

- higher resting rate **or** higher at start
- when exercise starts / then increases more / more rapidly

  accept description eg rise …. fall
- peaks (then falls)
- levels off <u>later</u> than healthy person
- higher rate during exercise

  *if no other marks awarded allow **1** mark for 'it's higher'*
- greater range

3

(b) (i) oxygen

accept adrenaline

accept O_2

*do **not** accept O, O2 or O^2*

1

(ii) cannot release sugar / glucose (from glycogen)

or

cannot store glucose / sugar (as glycogen)

1

need to receive glucose / sugar (from elsewhere)

ignore oxygen

1

for energy / respiration / cannot store energy

ignore aerobic / anaerobic

1

[7]

35 (a) proteins are not filtered

1

glucose is filtered and (re)absorbed

allow glucose (completely) reabsorbed

1

ions are filtered and some (re)absorbed

allow some ions are reabsorbed

1

urea is filtered [and some / none (re)absorbed]

allow some / no urea is reabsorbed

1

(b) more / a lot of sweating occurred

accept converse arguments for cold day

1

more / a lot of water loss (by sweating)

1

more / a lot of water reabsorption / more water absorption by the kidney

1

lower volume of urine

allow less urine / less water in urine

1

[8]

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

ignore cancer / AIDS

- as a sleeping pill

  *do **not** accept morning sickness*

- treating leprosy

1

(ii) thalidomide causes birth defects / abnormalities / described

in this order
ignore kill / harm / damage baby

1

to be (more) sure of not getting pregnant

*allow to be certain there is no baby **or** in case one doesn't work*

1

(b) (i) oestrogen

1

progesterone

1

(ii) any **two** from:

- reduce chances of ovarian cancer
- more effective (in preventing pregnancy)
- no pills (to remember) for 7 days (out of every 28)

  allow only taken for 21 days (out of 28)

- doesn't have to be taken at the same time every day

2

(iii) less chance of headaches

ignore won't get headaches

or

less chance of forgetting

allow lower dose of hormone
allow fewer side effects
ignore only contains one hormone

1

[8]

37 (a) (i) any **three** from:

*if diet given as answer = max **2***

- age (of athlete)
- gender (of athlete)
- starting concentration of glycogen
- type / intensity of exercise
- length of exercise period
- number of training sessions

*if none of these points gained amount of exercise = **1** mark*

- time interval between exercise sessions
- exercise at same time of day

*if last four points not awarded allow time (for exercise) for **1** mark*
ignore references to amount of energy
ignore they are both athletes

3

(ii) any **two** from:

- intensity of exercise
- amount of exercise between sessions
- starting concentration of glycogen
- fitness / health
- metabolic rate / respiration rate
- amount / mass of muscle / physique
- aspects of diet qualified, eg amount of food eaten

*do **not** accept amount of carbohydrate*
*if no other marks awarded allow height / mass / weight for **1** mark*

2

(iii) (B has) less glycogen

he = B

or (B's glycogen) fell more

accept use of approximate figures

or (B's glycogen) built up less

allow other correct observations from graph eg A is lower at end of first session

ignore rate of fall

1

(b) athlete **A** (no mark)

to gain full marks 'more' must be given at least once

athlete **A** had more glycogen / **B** has less (only if A chosen to complete marathon)

*accept converse argument for **B***

1

(glycogen / glucose) used in respiration

ignore anaerobic

1

(more) energy released / available in athlete **A**

allow 'energy made'

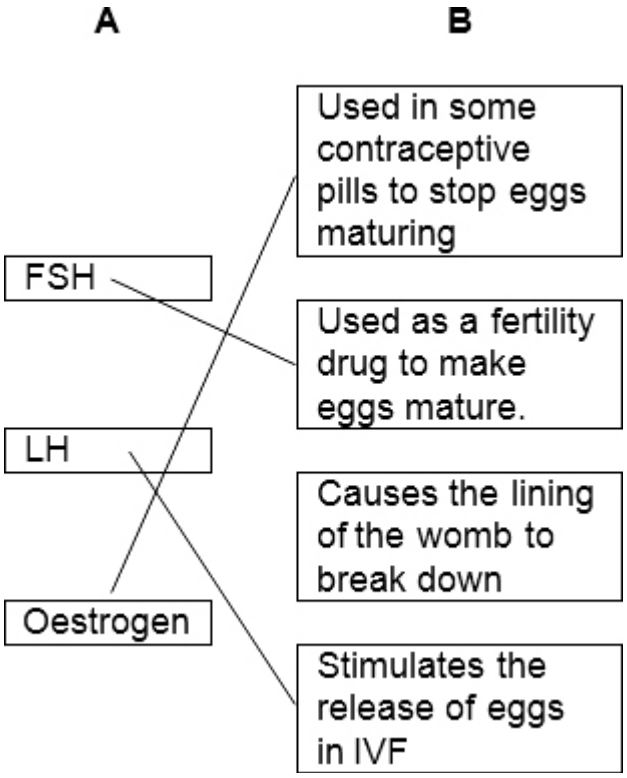
1

and either energy used for movement / muscle action / to run
or
(extra) glycogen → (more) glucose

1

[10]

38 (a)



mark each line from left hand box
two lines from left hand box cancels mark for that box

3

(b) (i) implant

1

(ii) any **one** from:

allow explanation for their method in (b)(i)

- lasts for 5 years / long(est)
- cannot forget to take / replace it / lose it
- (hormone) there all the time

ignore expense
ignore STDs
ignore side effects

1

(iii) any **one** from:

accept correct disadvantage for wrong method in (b)(i)

- needs surgery / operation
  allow it could go wrong
- painful
- infection
- have to wait five years for a child or more difficult to have a change of mind
  ignore expense
  ignore STDs
  ignore side effects

1

[6]

39 (a) chance of getting pregnant decreases with age

ignore figures

1

chance of infertility increases with age

1

(b) (i) causes eggs to mature

allow growth
*do **not** accept produced*
*do **not** accept releases egg*
ignore references to oestrogen / LH / uterus / womb

1

(ii) causes egg release

*do **not** accept matures egg / growth of egg / produces egg*
ignore references to other hormones and uterus / womb

1

(c) embryo

allow (fertilised) egg divides

1

insert (embryo) into womb / uterus

ignore electric shock

1

[6]

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

- (in) food / named
  allow eating
- (from) respiration
  *do **not** allow breathing*

1

(b) (i) the greater / heavier the body mass the more water (should be drunk)
ignore references to hot / cold day
accept positive (relationship)
ignore figures unqualified

1

(ii) 2200

1

(iii) 400
*award **2** marks for correct answer, irrespective of working*
*allow ecf from b(ii) for **2** marks*
*if no answer or incorrect answer: 2200 - 1800 **or** b(ii) - 1800 gains **1** mark*

2

(c) need to replace water lost / prevent dehydration / keep hydrated
idea of balancing input and output

1

from / by (more) sweat
ignore other losses

1

(d) kidney

1

[8]

41 (a) (i) insulin
accept glucagon (correct spelling only)

1

(ii) pancreas
accept phonetic spelling
allow pancrease

1

(b) (i) 11(.0)
accept in range 10.5-11 (.0)

1

(ii) any **two** from:

ignore numbers unless comparative

- high(er) concentration (of blood glucose) (anywhere / any time)
  accept 115 not 88
  139 not 99
- large(r) increase (in concentration after the drink)
  accept increase by 24 not 11 / their b(i)
- fast(er) / steep(er) rise
  accept it takes 3 hours not 1 ¼ hours to get back to original level
  accept it takes a long time to get back to normal
- slow(er) fall

2

(iii) any **one** from:

- insulin present / produced
  accept glucagon not produced
- (used in) respiration
  allow exercise
- taken into cells
  allow converted to glycogen
  allow taken into liver (cells) / muscle (cells)
  allow produce / make energy

1

[6]

42 (a) (i) 94.9

correct answer with or without working
*if answer is incorrect 100 - (2.5 + 2.6) gains **1** mark*

2

(ii) protein molecules in the plasma cannot pass through the filter in the kidney

1

(b) (i) partially permeable

1

(ii) the same as

1

(c) any **one** from

- hazards of operation / named example
- may be rejected / need to use immunosuppressant drugs / need to find (tissue) match
  allow long term drug use
- not enough donors
  allow a long waiting list
- transplants have a limited life

1

[6]

43 (a) any **two** from:

*allow 2 correctly named substances for **2** marks*
ignore water

- urea
- ions / salt(s) / correct named example
  ignore minerals
- second correct named example
- hormones / named example
- allow ammonia
- allow creatinine
- allow uric acid
- allow bile pigment

2

(b) (i) glucose filtered (into kidney tubule)
accept Bowman's capsule

1

glucose reabsorbed **or** glucose taken back into blood

1

all glucose taken back into blood / all reabsorbed

1

(ii) not all glucose reabsorbed

1

because not enough time / length **or** too high
a concentration in tubule / not enough carriers

1

[7]

44 (a) FSH / follicle stimulating hormone

allow FHS

either order

1

LH / luteinizing hormone

1

(b) any **four** from:

- egg(s) collected from ovary
- (eggs) mixed with sperm **or** fertilisation occurs

  allow eggs and sperm put into tube
- fertilised egg divides
- embryo formed
- (embryos) inserted into womb / uterus

  ignore references to vagina
- FSH matures egg **and** LH releases eggs

4

[6]

45 (a) (i) lung

1

(ii) kidney

1

(iii) bladder

1

(b) (i) more

1

the same

1

less

allow synonyms

1

(ii) cools / reduces temperature

or

prevent overheating

ignore reference to sweat

1

[7]

46 (a) pancreas

allow phonetic spelling

1

(b) 4(.0) to 7.2 **or** 7.2 to 4(.0)

1

(c) 13 – 7 = 6

*working shows 6 = **1** mark*

1

6/2 = 3 units

*accept the correct answer to the calculation, 3 units, for **2** marks, irrespective of working*

1

increase (dose)

accept indication of increase, eg extra / more / + could be in working lines

1

[5]

47 (a) in table, in sequence:

allow descriptions for increase / decrease

decrease

1

increase

1

(b) **No**

older have lower % / less chance of rejection (than younger) (1)

allow figures

older have higher % / more chance of still working (after 5 years than younger)

allow figures

allow in older patients kidney works for longer

1

or

Yes

*allow max **1** mark if Yes*

older have lower % / less chance of surviving (at least 10 years than younger)

allow older people are more likely to die

1

[4]

48 (a) (i) A

1

(ii) (protein molecule is) too large to pass
through the filter / cannot pass through the filter

1

(b) RBC is too big to / cannot pass through filter

1

haemoglobin released when RBC bursts
or
haemoglobin inside RBC in a healthy person

1

haemoglobin is small enough to / can pass through filter
or
haemoglobin diameter < pore diameter
or
haemoglobin only 5.5 nanometres

1

[5]

49 (a) any **two** from:

- FSH
  *do **not** accept FHS*
- LH
  *do **not** accept LSH*
- oestrogen
  allow progesterone as alternative to any hormone

2

(b) egg(s) / egg cell(s) / ova
*do **not** accept ovaries*
*do **not** accept fertilised eggs*

1

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

- don't have to take (pill) every day
  ignore side effects
- can't forget to take
  ignore cost
- more reliable
- lasts 3 years / lasts longer
- hormone level in blood more constant

1

(ii) any **one** from:
ignore cost

- eg painful (to insert) / uncomfortable / causes rash
  ignore side effects unqualified
- woman can't take it out
- more difficult to stop treatment
- needs to be removed if woman decides to become pregnant
  allow have to wait three years to become pregnant

1

[5]

50 (a) inhibit FSH production

ignore LH production

ignore wrong hormone

1

so egg does not mature

ignore egg production / egg release / egg development

1

(b) any **three** comparisons: eg

- ease of insertion compared ie ring easily inserted by woman whereas implant needs professional **or** no damage to skin with ring

  *comparisons must be made ie two separate lists will gain no marks unless the lists are linked by eg whereas / however / on the other hand **and** the points are made in the same order in both lists*

- length of delivery compared eg 3 weeks for ring whereas 3 years for implant
  or delivery longer for implant
  or
  woman has to remember to insert ring whereas does not have to remember to insert implant

  ignore cost

- effectiveness compared eg 0.3 % failure with ring whereas nil for implant **or** implant more effective

- number giving up compared eg 4 % for ring whereas 2 % for implant **or** fewer women give up using implant

  or ring might cause vaginal discomfort whereas implant may cause irregular menstrual bleeding

3

reasoned conclusion (normally at the end)

ie must state 'better because....'

1

[6]

51 (a) insulin

extra ring drawn cancels the mark

1

(b) pancreas

extra ring drawn cancels the mark

1

(c) diabetes

extra ring drawn cancels the mark

1

[3]

52 (a) (protein molecules too) big **or** larger than pore size

allow cannot fit through the pores / hole / gaps

1

(b) (i) diffusion

1

(ii) high to low concentration

ignore along gradient / across gradient

or high concentration in blood, low concentration in dialysis fluid

allow there is none in dialysis fluid

or down concentration gradient

or correct use of numbers

1

(c) any value between 3.15 and 3.25 (inclusive)

1

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

- kidney works all the time **or** dialysis works for short time

  ignore enables an active life

  or

  dialysis needs regular trips to hospital / regular treatment / long term treatment

  accept kidney transplant is one off treatment

- kidney maintains correct concentration all the time **or** no build-up as between dialysis sessions

- no need to regulate diet **or** correct example – eg low salt / low protein / low fluid intake as with dialysis

- cheaper in the long term

2

(ii) any **two** from:

- rejection / described **or** need to use immunosuppressants **or** need to take drugs for life
  allow may need later replacement
- susceptible to other infections
- hazards of operation / anaesthetic
- shortage of donors / match
- high initial cost

2

[8]

53 (i) pituitary

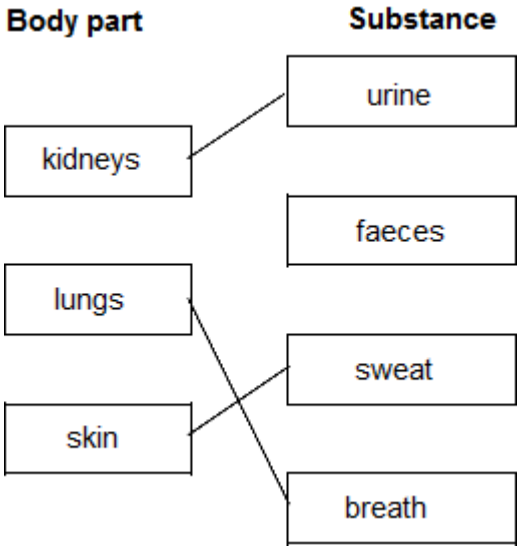
1

(ii) ovary

1

[2]

54 (a)



1 *mark per correct line*
extra line from a body part cancels the mark

3

(b) (i) 1800 cm^3

1

(ii) decreases

1

(iii) any **one** from:

- less / no sweat
- less / no cooling (needed)
- less / reduce / no heat loss / keep warm

1

(c) increases

1

[7]

55 (a) pancreas

1

(b) the diabetic should get more energy from fat

1

the diabetic should get less energy from carbohydrate

1

(c) (use) insulin

allow pancreas / stem cell transplant
*do **not** allow injection / transplant /stem cells / tablets alone*
ignore exercise

1

[4]