Mark schemes

1

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

each for 1 mark

2

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

each for 1 mark

3

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

each for 1 mark

4

[9]

2

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

each for 1 mark

4

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

each for 1 mark

4

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

each for 1 mark

5

[13]

3

(a) (i) reduced sharply

for 1 mark

1

(ii) converted to glucose which is respired to produce energy

(allow answers in terms of glucagon)

gains 3 marks

3

(b) (i) athlete A's was most effective
since resulted in highest muscle glycogen level on day of race
for energy release during race

for 1 mark each

3

(ii) e.g. excess carbohydrate stored as glycogen rather than fat in short term
particularly if glycogen stores depleted

for 1 mark each

2

[9]

4

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

for 1 mark each

3

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

any 3 for 1 mark each

3

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

any 3 for 1 mark each

3

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

any 3 for 1 mark each

3

(d) **maximum two benefits e.g.**
prevents unwanted pregnancy when mother's physical health at risk
or when mental health at risk
or following e.g. rape
maximum two problems e.g.
involves killing 'foetus' rather than preventing gametes meeting
may lead to irresponsible attitude to sexual behaviour
reference to ethical/religious attitudes
for 1 mark each

4

[16]

5

(i) 2500 – 1000
= 1500
for 1 mark each

2

(ii) 3 of
filter blood
reabsorb water
in sufficient quantities to keep body water content constant
produce dilute urine if water content of body high/reverse argument
any 3 for 1 mark each

3

[5]

6

(a) (i) blood sugar rises because insufficient insulin secreted by body
for 1 mark each

2

(ii) increase in rate of conversion of glucose to glycogen in liver
for 1 mark each

3

(iii) muscles use more glucose from blood in respiration to release energy needed for exercise
for 1 mark each

3

(b) 3 of

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

any 3 for 1 mark each

3

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

for 1 mark each

3

(d) 3 of eg

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

any 3 for 1 mark each

3

[17]

7 (a) urine

for 1 mark

1

(b) (i) protein

for 1 mark

1

(ii) e.g. molecules too large

for 1 mark

1

(c) reabsorbed into blood

for 1 mark

1

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

for 1 mark

1

[5]

8 (a) (i) protein

for 1 mark

1

(ii) e.g. molecules too large

for 1 mark

1

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

for 1 mark

1

(c) (i) restores concentration of dissolved substances, to normal level,
wastes pass into dialysis fluid

for 1 mark each

3

(ii) the same (0.35) or slightly below (<0.35),
so that concentration of salts in blood remains constant

for 1 mark each

2

[8]

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

for 1 mark each

2

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

for 1 mark each

2

[4]

10 (a) more energy needed,
for increased muscular activity

for 1 mark each

2

(b) increased sweat production,
evaporation of sweat cools body,
vasodilation OWTTE,
more heat loss (by radiation)

for 1 mark each

4

[6]

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

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

1

(ii) in the blood

for 1 mark

1

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

for 1 mark

1

[3]

12 (a) all sectors correctly plotted – 2 marks one plotting error only – 1 mark
2 **or** more plotting errors 0 marks

breath = 3 sectors
urine = 6 sectors
sweat = 10 sectors

2

all sectors labelled

allow 2 labelled only

1

(b) respiration

1

breath

1

amino acids

1

urine

1

[7]

13 (a) pituitary (gland)

1

ovaries

1

allow corpus luteum

(b) idea of stimulating release of eggs

1

preventing release of eggs

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

1

[4]

14 (a) (i) all plots correct

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

2

(ii) 6

correct answer with no working = 2
allow 1 mark for (60 ÷ 100) × 10
N.B. correct answer from incorrectly recalled relationship / substitution = 0

2

(b) lungs

1

liver

1

kidneys

1

[7]

15 ovaries

accept ovary

1

womb

accept uterus

1

fertility

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

1

contraceptive(s)

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

1

[4]

16 (a) 180 **or** 179.9

1

(b) 99.4

1

[2]

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

answers should relate to the ideas in the list

birth control pills are 99 % effective in preventing pregnancy

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

condom (neutral)

the woman's monthly periods become more regular

2

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

answers should relate to the ideas in the list

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

only 99 % effective

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

a woman has to remember to take a pill every day

2

[4]

18 (a) (i) meiosis

1

(ii) mitosis

1

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

1

Y FSH

1

(ii) stimulates LH production

1

inhibits FSH production / production of **Y**

1

[6]

19 (a) 850

1

(b) (i) more

because exercise makes us sweat **or** work harder

accept to cool the body

do not credit body hotter or giving off more heat

2

(ii) more

because she respires more

*accept she breathes (in and out) more **or** heavier **or** faster*

2

(iii) less

because (more) water has been lost by sweating **or** breathing out **or** other methods

accept arguments about conservation of water

2

(c) kidney

1

[8]

20 (a) (i) in blood **or** the circulation system **or** plasma

*accept arteries and veins **or** blood vessels*

*do not accept slowly **or** in blood cells*

1

(ii) glands

*accept endocrine glands **or** endocrine*
do not accept a named gland

1

(b) the pancreas

accept islets of Langerhans

1

any **one** from

does not produce (sufficient) insulin
(blood) sugar is not (properly) controlled

1

insulin injections **or** inhalers

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

1

[5]

21

(a) increases

gains 1 mark

but
70 × more (concentrated)

gains 2 marks

2

(b) *idea that*
water is reabsorbed;
urea is not reabsorbed (as much)

each for 1 mark

(credit (much) more water reabsorbed than urea)

gains 2 marks

2

[4]

22

(a) A > B > C;
A + B + C = 2 800;
one number correct
two numbers correct
each for 1 mark

4

(b) urine;
less produced;
kidneys absorb more water
or
to maintain (water) balance
each for 1 mark

3

[7]

23

(a) LH or FSH (only one mentioned)
gains 1 mark

but
LH and/or FSH (both mentioned)
gains 2 marks

rises (sharply)
for 1 further mark

3

(b) FSH or LH level kept low
no ovulation/egg not released
for 1 mark each

2

(c) for:
very effective/prescribed/
personal preference/convenient/
promote family values

any two for 1mark each

against:
upset internal environment
named side effects (allow two)
religious belief
no protection against VD/AIDS
long-term effects
moral belief

any two for 1 mark each

4

[9]

24

(a) *idea:*
filtered

for 1 mark

reabsorbed

gains 1 mark

but
all reabsorbed

gains 2 marks

correct reference to blood

for 1 mark

4

(b) (i) *evidence of* $\frac{170 - 1.5}{170} \times 100$

gains 1 mark

but
99(.1)(%)

gains 2 marks

2

(ii) *idea:*
more urine
for 1 mark

body dries out/dehydrates
or
needs to drink more
for 1 mark

2

(c) no effect for first half hour/until 1 hour
rises to 210cm^3/to 3x level after 1 hour
rises to 280cm^3/to 4x level after 1½ hour
reference to 280cm^3/1½ hour as maximum level
falls to (near) normal after 2½ hours
comparison of rates of change e.g. rapid then slower rise and/or steady fall
not all of 800cm^3 excreted (extra to normal)
each for 1 mark to max. of 5
(do not credit simply rises then falls)

5

[13]

25 *idea:*
glucose level rises
pancreas releases insulin
glucose → glycogen (in liver)/removes xs glucose
glucose level falls/returns to normal
for 1 mark each

[4]

26

- cost of dialysis and transplant <u>compared</u>

- *idea that* both expensive and may need to balance cost against other medical priorities
- restricted diet/movement with dialysis

and

- no restriction/independence for transplant

each for 1 mark

- *idea* that donated kidney may not be available
- transplant may be rejected/dialysis consistently reliable

[Credit problem of finding body access points for repeated dialysis over the long term]

[5]

27

(a) (i) asexual / non-sexual / cloning *[not artificial]*

for 1 mark

1

(ii) gene / allele / chromosome / DNA

for 1 mark

1

(iii) A) same / look alike / similar

gains 1 mark

but same sex / all female / all black / identical / clones

gains 2 marks

B) same as the black (female)

for 1 mark

3

(b) (i) ovaries [not reproductive organs]

for 1 mark

1

(ii) hormones / fertility drugs / FSH

for 1 mark

Allow LH

[Do not allow oestrogen / fertility treatment]

1

[7]

28 (a) sweat – 6 squares high
urine – 15 squares high

each to < half a square for 1 mark each

2

(b) for *hot day (assumed unless otherwise stated)*

- same in breath
- same total
- more in sweat* / sweats more
- less in urine* / urinates less
- correct quantification of either * eg **x**cm^3 more / less or **n** times more / less
  250 cm^3 more sweat 6 × more sweat
  250 cm^3 less urine ¼ / 25% less urine
  any four • for 1 mark each
  [Do not allow just figures quoted from the table]

4

(c) *ideas that*

- you sweat more **<u>to keep cool</u>** on a hot day
- urine adjusted (by kidneys) to keep balance / to keep same total loss
  each for 1 mark
  [Accept "more sweat therefore less urine"]
  [Credit ideas from (c) if given in (b)]

2

[8]

29 (a) breath same + sweat more* + urine less* (*All <u>three</u> needed)*
<u>or</u>
total same but split differently

for 1 mark

**either change correctly quantified eg*
x cm^3 more/less or **n** times more/less

for 1 further mark

sweat 250 more 6 x more
urine 250 less ¼/25%less

2

(b) *ideas that*

- you sweat (more) to keep cool on a hot day
- urine adjusted (by kidneys) to keep balance / to keep same total loss

each for 1 mark

(NB credit these answers if in (a) candidates have answered more fully than expected)

2

(c) *ideas that*

- when blood water normal/100% / steady kidney re-absorbs water at low/steady rate
- when blood water percentage falls, the rate at which kidney re-absorbs water rises
- when blood water percentage rises again, is high/normal the rate at which kidney re-absorbs water falls
- 97 / 97.5% / 98% (of normal) blood water is the point at which the kidney's reabsorption rate starts to increase / decrease

each for 1 mark

[allow idea that there is delay between blood water percentage changing and rate of re-absorption changing]

4

(d) *any reference to* hormone(s) / pituitary (gland)

gains 1 mark

but
ADH or hormone(s) from pituitary (gland)

gains 2 marks
(do not allow 'brain)

2

[10]

30 (a) 1

for 1 mark

1

(b) skin
kidneys

for 1 mark each

2

(c) (i) *idea that*
there will be less / no sodium (per day) (in her urine)
for 1 mark

1

(ii) *idea that*
she should take in more sodium (chloride) / salt
(*allow* stay indoors / in shade **or** be less active)
for 1 mark

1

[5]

31 oestrogen produced
gains 1 mark

but N.B. sequence important here
oestrogen produced by ovary
gains 2 marks

LH produced
gains 1 mark

but
LH produced by pituitary
gains 2 marks

LH causes egg release
for1 mark

[4]

32 (a) 1
for 1 mark

1

(b) (i) there will be less / no sodium (per day) (in her urine)
for 1 mark

1

(ii) *idea that*
she should take in more (sodium (chloride) / salt)
(*allow* stay indoors / in shade **or** be less active)
for 1 mark

1

(c) active transport / uptake
(*do not allow* diffusion / osmosis)
the concentration / gradient
for 1 mark each

2

[5]