Mark schemes

1

(a) (i) 50

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

2

(ii) any **two** from:

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

allow peaks at 65 - 74
ignore comparisons with men

2

(b) (i) stomach

1

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

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

1

[6]

2

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

lower maximum / peak / less change

1

slower rise / change

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

need to take less insulin / less likely to hyper

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

1

(ii) any **four** from:

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

4

(b) any **three** from:

advantages (compared to insulin injections):

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

disadvantages (compared to insulin injections):

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

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

3

[9]

3 (a) mineral ions

1

water

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

1

(b) (i) blood plasma

1

(ii) dialysis fluid

1

(iii) diffusion

1

(iv) partially permeable

1

(v) small

1

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

1

[8]

4

(a) (i) no effect / little effect

1

(ii) reduced

ignore reference to later increase

1

(b) (i) more (re)absorption

do not allow if extra incorrect reference to filtration made

1

or more (material) taken into blood

of water

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

1

(ii) ions in blood diluted

1

or concentration of ions decreases

increased water reabsorption

do not allow if extra incorrect reference to filtration made

or more water present in blood

accept sensible alternative suggestion
eg reabsorption of ions disrupted

1

[6]

5

(a) (i) lungs

1

(ii) skin

1

(iii) kidneys

1

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

1

(ii) drink water / sports drink

ignore antiperspirant

1

[5]

6 (a) 4000

*award **both** marks for correct answer, irrespective of working*

*1500 + 2000 + 500 gains **1** mark*

2

(b) day 2 (no mark)

any **two** from:

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

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

accept a lot of sweating

- less (water in) urine

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

2

(c) (i) respiration

1

(ii) cools / removes heat owtte

ignore 'maintains body temperature' unqualified

1

(iii) osmosis

1

[7]

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

- amylase / carbohydrase
- protease

  allow trypsin
- lipase

2

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

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

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

1

(ii) any **one** from:

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

  allow high fibre

  ignore reference to low carbohydrate

1

(iii) any **one** from:

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

1

(iv) (take) insulin

allow pancreas transplant

1

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

1

[7]

8 (a) (i) thermoregulatory centre (in brain)

accept hypothalamus

1

(receptors sensitive to/measures) temperature of <u>blood</u>

1

(ii) any **one** from:

- receptors (in skin)
- (skin) sends information / signals / impulses / messages to brain / thermoregulatory centre

1

(b) any **three** from:

(cold conditions)

- muscle (X) contracts when cold
- no / less blood through capillaries
- no / less heat lost / radiated
- no / less sweat produced

(hot conditions)

- muscle (X) relaxes/does not contract when hot

*NB X contracts when cold and relaxes when hot = **2 marks***

- (more) blood through capillaries
- more heat lost / radiated
- more sweat produced

all other points must be clearly identified by correct conditions

*max **2** if idea of capillaries moving but ignore capillaries dilate*

3

[6]

-

9

(a) (i) bladder

1

(ii) glucose

1

protein

extras – CANCEL

1

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

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

2

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

1

(c) (i) urea

1

(ii) 4.2

1

[8]

10 (a) any **three** from:

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

3

(b) (i) in a healthy person

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

1

in person with disease

lets protein through (filter) owtte

1

(ii) advantages:
up to any **three** from:

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

3

disadvantages: **at least one** from:

- rejection / problem finding tissue match
- use of immuno-suppressant drugs → other infections
- dangers during operation / example described

must have at least one advantage and at least one disadvantage for full marks

1

[9]

11 (a) (i) 1400

*award **2** marks for correct answer if no working shown*

*2400 – (300 + 600 + 100) or equivalent for **1** mark*

2

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

1

(b) **A**: chemical reactions

B: food

C: drinking

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

1

(c) cools / reduces temperature

allow 'maintaining body temperature' owtte

*do **not** allow regulate unqualified*

ignore reference to urea

numerical references to temperature should be correct

1

(d) more sweat produced

1

less urine produced

1

[7]

12

(a) pancreas

1

(b) protease

allow proteinase

1

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

if named, enzymes and part must be correct

1

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

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

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

1

(d) any **two** from:

pros

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

accept allows us to find a cure

cons

- harmful / cruel to dogs

accept kills dogs

- dogs may not be (metabolically) like humans

2

conclusion justified by argument

1

[7]

13

(a)

glucose	☑
urea	☑
water	☑
sodium ions	☑
protein	☐

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

max 2

(b) (i) protein cannot pass through filter

or

protein (too) large

or

protein stays in the blood

1

(ii) reabsorbed

1

(c) (i) less

1

(ii) more

1

[6]

14

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

1

(ii) glucose is present in the filtrate

ignore units

1

or

0.8 in filtrate

no glucose is present in the urine

or

0 in urine

1

(iii) active transport – up / against (concentration) gradient

it = active transport throughout

1

or

from low to high (concentration)

uses energy / ATP

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

1

(b) water reabsorption / taken out

other substances cancel mark

or

water taken into blood / body

1

[6]

15 (a) 94.8

1

(b) (i) to cool (the body) / maintain (body) temperature

*do **not** accept let out heat*

1

(ii) water **and** ions

1

(iii) water ignore CO_2, and vapour

1

(c) any **two** from:

used in respiration

provides energy

(energy) needed for movement / running / muscle action

2

[6]

16

(i) dialysis (machine) or kidney machine

1

(ii) (specially chosen kidney) similar tissue type

accept same blood group

1

(irradiation of bone marrow) to stop white cell <u>production</u>

allow any named white blood cell

1

(treated with drugs) suppress immune system

1

(sterile conditions) avoid exposure to pathogens / infection

1

[5]

17

(a) (i) 6

1

(ii) 4

1

(b) (i) pancreas

ignore islets of langerhans

1

(ii) 'X' anywhere between >1 and ≤ 2 hours

anywhere in that column

1

(c) any **four** from:

<u>water</u> movement

*do **not** accept solution*

out of cells

dilute to concentrated solution

accept reference to correct gradient -
high Ψ to low Ψ ***or*** *high to low 'water concentration'*
must be unambiguous – i.e. ***not*** *'high to low concentration'*
accept low to high concentration

reference to partially / selectively
permeable membranes **or** described

cells shrink / get smaller

allow crenated
ignore plasmolysed / flaccid / floppy
etc

4

[8]

18 (a) (i) glucose passes through the filter / from plasma to filtrate

ignore diffuses

1

(ii) glucose is reabsorbed or glucose taken back into the blood

ignore filtered

1

(b) protein (molecules) are (too) large (to pass through the filter)

1

(c) any **three** from:

blood becomes more concentrated / too
salty / has lower water potential **or** too
little water in the blood

hypothalamus detects this

release of ADH

by pituitary

increased **re**absorption of water

3

[6]

19 (a) urea

1

(b) any **four** from:

- suitable for short term
  accept reverse arguments with respect to transplants
- no long term drug treatment
- no rejection chance
- no / less risk during surgery
  accept risk of anaesthetic
- operations unsuitable / risky for weakness / old age
- risk of infection
- no (suitable) kidneys available for transplant / long waiting list /
- ess painful

4

[5]

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

- chemical messenger
- chemical / substance released in one part to have effect elsewhere in body
- chemical / substance which affects another / target organ / tissues / cells
  allow chemical from endocrine gland

1

(ii) in blood / circulatory system / any named part including plasma
extra wrong answer would cancel example
***not** red blood cells*

1

(b) **Quality of written communication**:
correct use of at least two relevant scientific term**s** spelt phonetically
e.g. pregnancy, ovulation, FSH, oestrogen, progesterone, ovary, follicle, circulation, thrombosis, feminisation, sperm count, STD
Q ✓ or Q ✗

1

any **three** from:

Oral contraceptives:

(benefit)

- prevent (unwanted) pregnancy **or** prevent egg release
- regulate menstrual cycle / periods

(problems)

- prolonged use may prevent later ovulation / cause infertility
- named side-effect on female body
  e.g. circulatory problems / weight gain / nausea / headache / breast cancer / mood swings
- increased promiscuity / increase in STD's / STI's
- named side-effect on environment
  e.g. feminisation of fish **or** lowered sperm count in human males

Fertility drugs:

(benefit)

- can enable woman to have children **or** to become pregnant **or** stimulates egg release

(problem)

- multiple births

*for full marks must score at least **one** re contraceptives **and** at least **one** re fertility drugs*

*if unclear which type of hormone maximum **2** marks from 3*

3

[6]

21 (a) (i) respiration

1

(ii) 9600

if correct answer, ignore working / lack of working

$\frac{80 \times 12000}{100}$ *for **1** mark*

2

(b) any **three** from:

- dilates / widens **or** muscle in wall relaxes **or** sphincter opens
  *do **not** accept expands or just gets bigger*
- more blood flows near skin surface **or** more blood through capillaries
- heat lost by radiation / convection / conduction
  ignore evaporation
- heat loss from blood / cools blood

3

(c) hypothalamus / brain

1

[7]

22 (a) aerobic

1

respiration

*'anaerobic respiration' = **1** mark*

1

(b) any **five** from:

- glucose is a small molecule
- glucose passes through filter **or** glucose is filtered out of blood **or** glucose enters the capsule / kidney tubule / Q
- glucose reabsorption **or** glucose taken (back) into blood
  *do **not** accept 'filtered' into blood / out of tubule*
- cells lining tubule have microvilli / shape described **or** cells lining tubule have large surface area
- active transport
- up concentration gradient
- use of energy / ATP
- long tubule for more reabsorption

5

[7]

23 (a) (i) (predator) lion

1

(prey) antelope

1

(ii) light

accept other positive indications

1

(iii) in sequence (top to bottom):

lion
antelope
grass

1

(b) (i) bacteria / fungi / saprotrophs

accept moulds / decomposers / microorganisms / microbes / saprophytes / saprobionts

1

(ii) aerobic

1

moist

1

warm

accept other positive indications1

1

(iii) carbon dioxide

1

mineral salts

1

[10]

24 (a) 345 to 350

ignore working or lack of working

use of 355 to 360 ***and*** *10 for* ***1*** *mark*

2

(b) any **two** from:

more sweating (at 37.6 °C)

'more' at least once in the first 2 points

more water loss **or** dehydration occurs

*do **not** accept prevents dehydration only*

blood becomes (more) concentrated / (more) salty **or** need to replace water

stimulation of the hypothalamus

2

(c) any **three** from:

evaporation

of water

*do **not** accept just water loss unqualified*

cools skin **or** uses heat from skin

cools blood / heat from blood (passing through skin)

related to sweating
cooling the blood
ignore vasodilation

3

[7]

25 (a) semi / selectively / partially / differentially permeable

1

separates blood and dialysis fluid

1

(b) any **four** from:

blood cells cannot pass through membrane

glucose retained in blood

to stop water passing into blood / osmosis

no (net) diffusion

urea removed from blood by diffusion

accept excreted

4

(c) problem may be temporary **or** has minor infection **or** problem could be cured by other means

1

operation / transplants carry risk

accept rejection

1

(d) (i) no antigens

1

on (the surface) of red blood cells

1

(ii) would cause agglutination / clumping if different

ignore clotting and coagulation

1

[11]

26 (a) water content (within the body/blood) is kept constant/ regulated/within very narrow limits/kept right

*do **not** accept general definition of homeostasis*

1

(b) because optimum conditions are needed for processes within the body / enzyme reactions
or
because there is a need to maintain a steady internal environment

1

(c) excretion is the removal from the body of waste **products**

n.b. faeces is not an excretory product but may be neutral

1

because waste products would (build up and) **become** toxic/poisonous/harmful

*do **not** accept makes us ill*
*do **not** accept block up system*
*do **not** accept unwanted products*

1

[4]

27 vasoconstriction/blood vessels near surface get narrower/decreased blood supply near surface of the skin **or** closing sweat pores

any three pairs. 2 marks for each pair of features and explanations up to a maximum of 6 marks

(which) prevents the heat being lost from the blood/prevents heat lost due to evaporation

explanation must match feature to score the second mark

.....

hair/fur stands on end **or** goosepimples

(this) increases the insulation effect

.....

shivering/increased muscular activity/movement/increased metabolism

(this) generates heat

*do **not** accept raise body temperature*

.....

behavioural changes/find somewhere warm/put on clothes / huddling / hibernate / grow **extra** fat / fur

(this) prevents/reduces heat loss

*do **not** accept keep warm*

[6]

28 (a) (i) endocrine glands **or** endocrine system

allow a specific named gland

1

(ii) (dissolved) in the blood(stream) **or** plasma

1

(b) (i) pancreas **or** islets of Langerhans

1

(ii) (it **or** insulin) lowers blood sugar level [1]

(by) (speeding up **or** increasing)
conversion of glucose to glycogen [1]

in the liver [1]

(and) speeding up **or** increasing uptake of glucose by body cells [1]

4

[7]

29 (i) liver

1

(ii) liver **or** B stores glycogen
or pancreas **or** D makes insulin

1

clear description of link

1

[3]

30 (a) (i) squirrels eat nuts;
each for 1 mark

owls eat squirrels
(2 marks for energy flow)

2

(ii) hazel tree
gains 1 mark

1

(iii) 1 squirrel population would decrease;
because fewer nuts available as food
each for 1 mark

2

2 owl population would decrease;
because fewer squirrels available as food
each for 1 mark

2

(b) (i) digested/broken down;

(ii) by microbes/reference to worm action;

each for 1 mark

2

(iii) March
warmer/increased activity of worms/microbes;

each for 1 mark

2

[11]

31

(a) oxygen;)
carbon dioxide;) *allow symbols*
water)

each for 1 mark

3

(b) graph with reasonable vertical scales;
accurate plotting of all points (ignore lines) and labelling lines
histogram – must be coded

gains 3 marks

3

(c) 6 of:
during exercise the level of CO_2 (in the blood) rises;
increased breathing to remove excess CO_2;
increased oxygen supply to muscles;
or increased breathing takes in more O_2
or increased heart rate takes more O_2 to muscles;
increased supply of sugar to muscles;
increased respiration rate;
enable faster rate of energy release;
reference to lactic acid (allow even though not on syllabus)/O_2 debt;
to avoid cramp;
anaerobic reference;
reference to removal of 'heat';

6

(d) high carbon dioxide concentration;
brain/central nervous system;
heart muscles (both)

3

[15]

32 (a) (i) increased shortly after ingestion then drops;

(ii) decreased shortly after ingestion then rises;

(iii) decreased shortly after ingestion then rises

each for 1 mark

3

(b) 8 of:
ingestion of ice cools blood flowing in (gut wall);
brain temperature lowered;
reduced blood temperature detected by brain;
impulses sent to sweat glands;
sweat production decreased/sweat pores close;
evaporation of sweat reduced;
it is evaporation of sweat which cools skin/heat loss is less;
therefore skin temperature rises;
because external temperature greater than body temperature;
sensibly linked example;

each for 1 mark

8

[11]

33 (a) (i) vole/small bird/beetle

gains 1 mark

1

(ii) oak trees are large organisms;
therefore their biomass is large; but their numbers are small

each for 1 mark

3

(b) 8 of:
energy stored in chemicals in cells/tissues/growth;
passed up food chain;
less energy stored at each stage in food chain/pyramid level;
because only part of energy taken in used for growth;
some lost in waste;
some used for repair;
used to main body systems;
some lost in respiration;
some converted into other forms of energy;
e.g. movement;
much lost as heat;
by time detritus feeders have used remains;
all returned to environment

each for 1 mark

8

c1 → animals
c2 → decomposers

2 marks for sequencing and organising the information

2

[14]

34 (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]

35 (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]

36 8 of e.g.:
muscles release energy as heat
blood flowing through muscles heated increased blood temperature sensed by centre in brain
impulses to skin blood vessels
particularly overlying muscles used in exercise to dilate
increased surface flow in these regions
gives pattern shown on thermographs
each for 1 mark

[8]

37 (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]

38 (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]

39 (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]

40

(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]

41

(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]

42 (i) *idea that* reduce water loss (in dry area) / conserve water

for 1 mark

1

(ii) ideas of evaporation (of moisture) uses energy / heat
or
large surface area of blood vessels / dilation of blood vessels
for evaporation / radiation

each for 1 mark

2

(iii) ideas of large surface area of (small) vessels / intertwining results in close contact of vessels idea that cool venous blood cools arterial blood

each for 1 mark

2

[5]

43 (a) (i) more
less
the same
(*accept* appropriate numbers)

for 1 mark each

3

(ii) sweating / evaporation / perspiration

for 1 mark

1

(b) in food / named solid food / eating
from respiration

for 1 mark each

2

[6]

44 (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]

45 (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]

46 (a) 180 **or** 179.9

1

(b) 99.4

1

[2]

47 any **three** from:

heat produced by muscles

during exercise

accept when working

by respiration

(skin) temperature over muscles rises / more blood to skin over muscles

*allow vasodilation **or** arterioles dilate over muscles*
reject capillaries dilate
sweating neutral

[3]

48 (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]

49 (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]

50

(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]

51

ideas that

internal cooling/cooling of brain causes reduction in sweating and of blood flow to skin

less sweating = less loss of heat from skin (= X)

less blood flow = less heat supplied to skin (= Y)

X > Y (so temperature rises)

each for 1 mark

[4]

52

(a) warmth/heat

oxygen/air

moisture

microbes/micro-organisms/fungi/moulds/bacteria

any three for 1 mark each

3

(b) do not rot

for 1 mark

1

[4]

53

(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]

54 *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]

55 1 sector correct

gains 1 mark

but all sectors correct B = 2 S = 9 U = 8

gains 2 marks

all sections labelled correctly (w.r.t. sector size)

for 1 mark

[3]

56

- 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]

57

(a) *idea:*
more (fossil) fuel burned (do not credit simply more people/cars/industry)
deforestation = less photosynthesis
deforestation = more respiration/burning

each for 1 mark

3

(b) *idea*:
climate change

for 1 mark

warmer/colder/drier/wetter
food production affected/starvation
mayor ecosystems destroyed/damaged

any two for 1 mark each

6

<u>sea level rise</u>

for 1 mark

low land flooded
less food grown/starvation
homes/factories flooded

any two for 1 mark each

Allow
polar ice caps melt
sea water expands

[9]

58 (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]

59 (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]

60 (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]