

Mark schemes

- 1**
- (a) any **two** from:
- drop the ruler from the same height
 - use the same / dominant hand each time
 - thumb same distance from ruler at the start
 - use same type / weight of ruler
 - drop the ruler without any force each time
 - keep arm resting on the edge of the table
- 2
- (b) 8
- allow 8.0*
- 1
- (c) 2 (in test number 2)
- 1
- (d) 12
- 1
- (e) $(12 + 13 + 13 + 9 + 8 / 5 =) 11$
- 1
- (f) $0.15 - 0.12$ (s)
- 1
- 0.03 (s)
- allow 0.03 (s) with no working shown for 2 marks*
- 1
- (g) carry out more repeats
- 1
- (h) caffeine speeds up reflex actions
or
reduces reaction time
- 1
- [10]**
- 2**
- (a) pupils dilated (at **B**)
- allow converse for A*
- 1
- in dim light / low light levels
- 1
- because circular muscles (in iris) relax
- 1
- (and) radial muscles contract
- 1
- (b) figure 2 shows myopia where light does not focus on the retina
- allow refraction*
- 1

in figure 3 the lens bends the light so that light focuses on the retina

1
[6]

3

- (a) any **two** from:
- drop the ruler from the same height each time
 - let the ruler drop without using any force
 - same type / weight of ruler
 - thumb should be same distance from the ruler each time at the start
 - use the same hand to catch the ruler each time
 - carry out the experiment with the lower arm resting in the same way on the table

allow description of holding bottom edge of ruler opposite the catcher's thumb

2

- (b) 117

1

- (c) $\frac{\sqrt{11.6}}{\sqrt{490}}$

1

0.1539

allow 01539 with no working shown for 2 marks

1

0.154

allow 0.154 with no working shown for 3 marks

1

allow ecf as appropriate

- (d) no indication beforehand when the colour will change
or
you might be able to tell when the person is about to drop the ruler

1

measurement of time is more precise (than reading from a ruler)

or

resolution (of computer timer) is higher

1

- (e) cerebral cortex

allow cerebrum

1

ignore identified lobes

- (f) cerebellum

1

[10]

4

- (a) tissue → organ → organ system

one right for 1 mark

three right for 2 marks

2

(b) **Epithelial tissue** → covers the outside and the inside of the stomach

more than one line from a tissue = no mark

1

Glandular tissue → produces digestive juices

1

Muscular tissue → allows food to be churned around the stomach

1

(c) (i) light

ignore dark

1

(ii) moving (to the dark)

1

(iii) any **two** from:

- use more woodlice
- repeat the experiment
- run for a longer time

2

[9]**5**

(a) (i) stimulus

1

(ii) cytoplasm

1

(b) (i) ear(s)

in this order only

1

eye(s)

accept retina

1

skin

ignore extra detail

1

(ii) A muscle

1

[6]**6**

(a) detect changes in surroundings **or** detect stimuli

allow any named stimulus for skin

1

convert information to impulse

allow send impulse to sensory neurones / brain

1

(b) (i)

muscle	contract(ion)
gland	release / secrete / produce chemical / hormone / enzyme

*1 mark for each effector**1 mark for each response**response must match type of effector (if given)**ignore examples**ignore relax(ation) / movement for contraction**do **not** allow expansion for muscles*

4

(ii) any **one** from:

- (maintain temperature at which) enzymes work best
- so chemical reactions are fast(est)
- prevent damage to cells / enzymes

allow prevent enzymes being denatured (by temperature being too high)

1

[7]

7

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

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

1

(to) transfer energy (for the run)

*allow (to) release energy (for the run)**do **not** allow produces energy**do **not** allow 'energy for respiration'*

1

(ii) any **one** from:

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

*ignore turgid / flaccid**cells burst is insufficient**allow cramp in muscle.*

1

- (b) any **three** from:
- thermoregulatory centre
 - (has temperature) receptors
 - (which) monitor blood temperature (as it flows through the brain)
 - (temperature) receptors in the skin
 - (receptors) send impulses to the brain

ignore vasoconstriction / vasodilation / sweating

allow hypothalamus

impulses sent to the thermoregulatory centre = 2 marks.

3

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

1

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

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

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

1

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

1

- (ii) inject insulin

or

have an insulin pump (fitted)

*do **not** allow swallow insulin*

accept exercise

accept inhale insulin

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

allow pancreatic transplant

1

[10]**8**

- (a) (i) sensory neurone

1

a synapse

1

- (ii) contract

1

- (iii) not connected to brain / coordinated only by spinal cord

1

- (iv) automatic / rapid (response)

allow no thinking / faster / less time

1

protects body from danger / from damage / from burning

1

(b) (i) caffeine decreases reaction time

accept caffeine speeds up / quicker reactions

1

(ii) the two sets of results overlap (considerably)

allow use of appropriate numbers – eg 5 of the ‘after’ results overlap with the ‘before’ results

allow ‘wide spread of results’

allow ‘it was just one person’ or ‘it was a small sample’

accept use of one pair of results only – if meaning is clear

accept use of one pair of overlapping results

1

(iii) any **two** sensible suggestions: eg

- more repetitions
- perform investigation on several other people
- use other (measured) amounts of coffee
- use different / more time intervals
- other suggested measure of reaction time – eg computer-generated light flash + time measurement
- use pure caffeine or caffeine tablets

2

[10]

9 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 apply a ‘best-fit’ approach to the marking.

0 marks

No relevant content.

Level 1 (1 – 2 marks)

There is a description of thermoregulation **or** at least one correct mechanism (skin, sweat glands or muscles) but roles may be confused.

Level 2 (3 – 4 marks)

There is a description of thermoregulation **or** some correct mechanisms (sweating, shivering, blood flow in the skin).

Level 3 (5 – 6 marks)

There is a clear description of thermoregulation by TC or skin **and** some correct control mechanisms.

examples of biology points made in the response:

full marks may be awarded for detailed description of what happens if the core temperature is either too high or too low

- temperature receptors in TC
- the TC detects (core) body / blood temperature
- temperature receptors in the skin send impulses to the TC, giving information about skin temperature
- if the core body temperature is too high: blood vessels / arterioles supplying the skin capillaries dilate / vasodilation

***do not** accept refs to veins instead of arterioles or answers that imply blood vessels have moved up / down through the skin.*

- so that more blood flows (through the skin) and more heat is lost
- sweat glands release more sweat to cool the body
- by evaporation
- if the core body temperature is too low: blood vessels supplying the skin capillaries constrict
- to reduce the flow of blood (through the skin) and less heat is lost

allow idea of blood diverted to vital organs in extreme cold

- muscles may shiver to release (heat) energy
- from respiration, some of which is lost as heat

[6]**10**

(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^{2/3} / $\dot{66.6}$ / 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)
- (ii) reabsorption of water by the kidney
- (iii) (protein) (too) big
 cannot pass through filter / stays in blood / cannot enter kidney tubule
 (glucose) small / can pass through filter
all taken back into blood / all reabsorbed
 allow the glucose is reabsorbed
- (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 (\pm) 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

2

1

1

1

1

1

4

[17]

11

- (a) sensory neurone
- (b) (i) synapse
- (ii) a chemical

1

1

1

- (c) (What happens to the muscle)
mark both parts of the question together

any **one** from:

- contraction / contracts
ignore relaxation / relaxes / tenses 1
- gets shorter

(How this helps the body)

- idea of protection for body (from damage / pain)
eg moves finger / arm away (from pin / stimulus / source of pain) 1

[5]

12

- (a) motor
allow efferent / postsynaptic
*allow **another** relay (neurone)* 1

- (b) release of chemical (from relay neurone)
allow ecf for 'motor' neurone from (a)
allow release of neurotransmitter / named example 1

chemical crosses gap / junction / synapse
allow diffuses across
allow chemical moves to X 1

chemical attaches to X / motor / next neurone (causing impulse) 1

- (c) (curare) decrease / no contraction
accept (muscle) relaxes 1

(strychnine) increase / more contraction
*if no other mark awarded allow 1 mark for (curare) decrease / no response **and** (strychnine) increase / more response* 1

[6]

13

- (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
- 14** (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

[6]

(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]

15

(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 $(36.8 \times 5) + (36.9 \times 3) + (37.0 \times 6) + (37.1 \times 7) + (37.2 \times 3)$

allow 888

1

divide by number of students

allow divide by 24

1

(ii) 10 / ten

1

(iii) so enzymes work (well)

ignore death / overheating / hypothermia

allow body reactions work (well)

1

[7]

16

(a) **A** sperm

1

B egg

1

C fertilised egg

1

D embryo

1

(b) insert into mother

ignore fertilise / check fertilisation / check viability

1

womb / uterus

1

(c) (i) one quarter

1

(ii) no / little chance of success over 42

1

reference to table of only two women in the age bracket 40-42 years became pregnant

the statement 'only 2 out of 53 40-42 year old women became pregnant / had babies' gains 2 marks

1

(iii) so fewer twins / multiple births

or

multiple births more dangerous

1

[10]

17

(a) **A** sensory (neurone)

ignore nerve

1

B motor (neurone)

ignore nerve

1

C spinal cord / central nervous system / white matter

accept grey matter

1

(b) by chemical / substance

allow transmitter

1

(c) muscle

allow extensor

ignore muscle names

1

[5]

18

- (a) (i) cerebral cortex
accept cerebrum / cerebral hemisphere 1
- (ii) MRI (scan)
allow CAT / CT scan
*do **not** accept MIR*
- or**
- electrode stimulation
allow electrical stimulation 1
- (b) (i) sharp point stimulates (pain) receptor (in the skin)
must be in correct order 1
- to send (nerve) impulse
ignore information and messages 1
- via sensory neurone 1
- to spinal cord
*do **not** accept spine, ignore CNS* 1
- crosses synapse
allow synapse in any correct context 1
- to other (relay) neurones / to brain
*do **not** accept motor neurone*
allow explanation in a flow diagram 1
- (ii) damage must be between arms and legs / below arms
accept below the waist 1
- since information from nerves in arms still reaches the brain / information from the legs doesn't reach the brain 1

[10]

19

(a) any **three** from:

- streamlined shape enables it to swim quickly (to catch fish)
- wings (provide power) to move quickly (to catch fish)
allow 'flippers'
- wings used for steering
- white underside / dark top acts as camouflage (so prey less likely to see it)
- long / sharp beak to catch fish

3

(b) any **three** from:

- reduces (total) surface area of penguins exposed to wind / cold atmosphere
- reduced number of penguins exposed (to wind / cold)
accept reference to movement in or out of the huddle
accept outer ones insulate / act as barrier
- reducing heat loss
allow reduced cooling
- 'share' body warmth / heat

3

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

- size of tubes
- volume of (hot) water
accept amount of (hot) water
- left for same length of time
allow measured at same time intervals
- starting temperature

2

(ii) any **two** from:

- tube alone (**C**) lost heat most (rapidly)
- tube **B** intermediate
- tube **A** least (rapidly)
allow correct use of figures for all 3 tubes
ignore just quoting final temperature

2

(iii) confirms suggestion

no mark awarded
accept correct answers referring to other suggestions in (b)

since (both outer and inner) tubes in bundle lost heat less rapidly (than 'stand – alone' tube)

comparison needed

1

penguins in a huddle lose less heat (than single ones)

accept 'it is the same for penguins'

1

(d) **if the core body temperature is too high**

blood vessels supplying the skin (capillaries) dilate / widen

*accept reference to arteries / arterioles but **not** veins / capillaries*

*do **not** accept references to movement of blood vessels*

ignore enlarge / expand

reference to skin / surface required only once

1

so that more blood flows through the (capillaries) in skin / near surface

*reference to 'more' needed at least once to gain **2** marks*

1

and more heat is lost

*reference to 'more' needed at least once to gain **2** marks*

1

if the core body temperature is too low

blood vessels supplying the skin (capillaries) constrict / narrow

allow full marks if 'too low' given first

*if no other marks awarded, allow vasodilation when too warm **and** vasoconstriction when too cold for **1** mark*

1

(e) (i) wings move to provide movement for diving

allow muscles contract / work

1

energy (for movement) comes from respiration

*do **not** allow produces / makes / creates energy*

allow energy comes from / is supplied by / is released by respiration

1

respiration / muscle contraction also releases heat

allow produces heat

1

(ii) any **three** from:

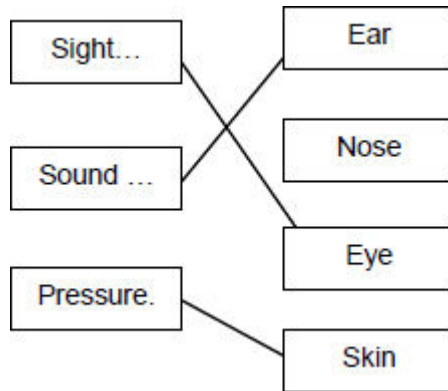
- feet not / less used **or** no muscle contraction in feet
allow little energy / heat released through respiration in feet
*do **not** allow veins / capillaries*
- vessels supplying feet constrict / less blood to feet
- so temperature in feet cools / decreases
- more heat loss from large surface area or rapid flow of cold water over foot

3

[22]

20

(a) (i)



1 mark for each line

do **not** award a mark for a 'change' that has two lines

3

(ii) receptor cells

1

(b) used to provide (extra) energy

allow (more) used in respiration

allow suitable reference to muscles

do **not** accept used for sweat

1

(c) (i) growth of muscles

1

(ii) (these drugs have) possible side / harmful effects

or

answers that refer to 'fairness of competition' e.g. cheating

1

[7]

21

(a) **A** cytoplasm

in this order only

1

B (cell) membrane

do **not** accept (cell) wall

1

(b) (i) synapse

1

(ii) (as) chemical

accept neurotransmitter or named

ignore references to how the chemical is passed

do **not** accept electrical

1

- (c) (from light-sensitive cell to connecting neurone) to sensory neurone
ignore references to synapses accept 'nerve cell' for neuron(e)
throughout penalise 'nerve' for neurone once only

1

(sensory neurone) to brain / CNS

allow (sensory neurone) to relay neurone / spinal cord

1

(brain / CNS) to motor neurone

allow (relay neurone / spinal cord) to motor neurone

1

(motor neurone) to (eyelid) muscle

ignore effector

1

[8]

22

- (a) if body temperature too high blood vessels supplying skin (capillaries) dilate / widen
*do **not** accept capillaries / veins dilate/constrict*

1

if body temperature is too low blood vessels supplying skin (capillaries) constrict / narrow

*do **not** accept idea of blood vessels moving (through skin)*

1

ignore expand

accept arteries / arterioles for 'blood vessels'

if no reference to skin allow blood vessels dilate and blood vessels constrict for one mark

so more / less blood flows through skin (capillaries) or nearer the surface of the skin
must correctly relate to dilation or constriction

1

so more / less heat is lost (from the skin by radiation)

must correctly relate to dilation or constriction

1

- (b) sweat released

1

cannot evaporate because of high humidity / all the water vapour in the air

1

so less heat lost / less cooling

or

it is evaporation of sweat that cools the body

1

[7]

23

- (a) (i) addictive
allow addicting / addict / addicted / addiction or similar
allow phonetic spelling
*do **not** accept / additive / addition* 1
- (ii) junction / gap / space between neurones
allow nerve cells / nerves for neurones
allow idea where neurones /
nerve cells / nerves meet / join 1
- (b) (i) tablet with no drug
accept answers that convey this idea eg fake / dummy / sugar pill
allow injection with no drug
ignore drugs that don't work. 1
- (ii) for comparison
accept to see if drug / it works
*allow to see psychological effect **or** make sure, it is not all in the mind*
allow as a control
ignore 'to make test fair / unbiased' 1
- (iii) Neither doctors nor volunteers 1
- (iv) any **two** from:
- age (range)
 - sex / gender (mix)
 - previous smoking habits **or** eg number smoked (before trial)
or length of time smoked
 - number in the group
 - other drugs being taken **or** general health **or** height / weight / BMI / lifestyle / fitness
ignore factors already controlled
*ignore reference to all smokers **or** all want to give up* 2

- (c) higher percentage / number of smokers who had stopped smoking (than Drug B)

answers must refer to data and be comparative

allow best results / most effective

ignore best drug unqualified

ignore references to 12 weeks / 1 year

1

[8]

24

- (a) *ignore nerve / neuron(e) throughout*

A sensory

accept afferent

1

B motor

accept efferent

1

C relay

accept intermediate

1

- (b) stretch

allow pressure / pull / tension (in muscle)

*allow a hit at (point) **P***

ignore pain

1

- (c) any **three** from:

- chemical (release)

accept neurotransmitter / acetylcholine

- diffuses (across the gap / synapse)

- transmits impulse / information (across synapse)

allow transmits signal / message

- between neurones / nerve cells / named

*if named, must be either sensory / A to relay / C **or** relay / C to motor / B*

allow 'to the next neurone'

3

[7]

25

(a) Y - spinal cord / central nervous system / CNS

*do not accept spine**ignore nerve / nervous system / coordinator**ignore grey / white matter*

1

W - receptor / nerve ending

ignore sensory / neurone / stimulus

1

X - effector / muscle

allow gland

1

(b) any **two** from: eg*accept reverse argument for each marking point*

- reflex action quicker
- effect of reflex action over shorter period
- hormone involves blood system and reflex involves neurones / nerve cells
ignore nervous system / nerves
- reflex involves impulses and hormone involves chemicals
- reflex action affects only one part of the body
ignore involves brain
ignore outside / inside stimuli

2

[5]

26

(a) (i) the lower the temperature the shorter the time

*a trend is required**accept reverse***or**

the lower the temperature the more chance of frostbite

*accept the lower the temperature the faster you get frostbite**accept positive correlation but **not** directly proportional**ignore wind speed*

1

(ii) any value from 5 to below 10

*do not accept 10**allow less than 10 **or** < 10*

1

(b) Muscles 'shiver'

if more than two boxes ticked deduct 1 mark for each additional tick

1

Blood vessels supplying the skin capillaries constrict

1

[4]

27

(a) a stimulus

1

(b) (i) **A**

1

(ii) **C**

either order

1

D

1

(iii) **E**

1

(c) brain

allow spinal cord / CNS / central nervous system

*do **not** allow spine*

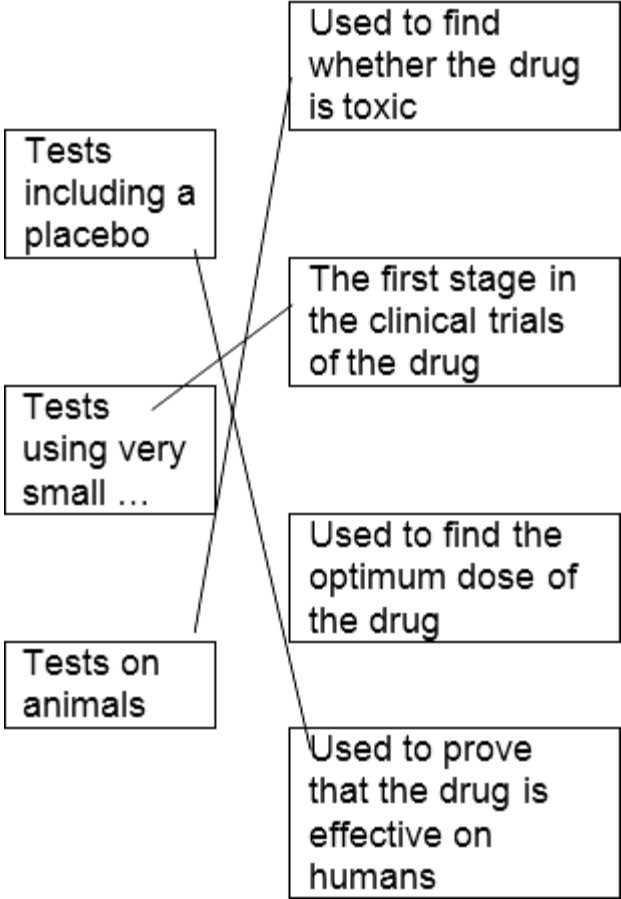
1

[6]

(a)

A

B



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

(b) any **three** from:

Students have been informed that the headline is not justified

- reference to reliability, eg only a small number of mice tested
or trial too short
or investigation not repeated
- reference to control, eg mice given caffeine not coffee
or 6 cups (equivalence) is more than 1 dose
- (and) the effect on mice might not be same as on humans
allow only tested on mice
- (also) text suggests that the treatment improves memory loss (rather than delays it)
accept text suggests disease cured

or mice already have memory loss or experiment only showed improvement in memory

or does not show **delays** Alzheimer's

or experiment not done on old mice

allow reference to the fact that mice engineered to have it

3

[6]

29

(a) in rainforest:

accept converse

(water from) sweat does not evaporate (as much)

max 1 if not clear whether desert or rainforest

1

any **one** from:

- (due to) less wind / higher moisture / humidity
- less cooling effect

ignore references to temperature

1

(b) blood vessels supplying capillaries dilate / widen **or** vasodilation

*do **not** award mark if candidate refers only to blood vessels dilating
or to capillaries dilating.*

*accept 'arteries' or 'arterioles' for 'blood vessels supplying,
capillaries' but do **not** accept 'veins'.*

ignore expand / get bigger / relax / open

*do **not** accept idea of blood vessels moving*

1

more blood (through skin / surface capillaries) leads to greater heat loss

1

[4]**30**

(a) any **two** from

- reference to role of thermoregulatory centre detecting rise in temperature (of blood or skin) **or** / causing increase in sweating
- more evaporation
*need to refer to more at least once to gain **both** marks*
- more cooling / heat loss
*without reference to more only award max **1** mark if both ideas given, eg cooling alone gets no marks*

2

(b) blood vessels supplying (skin) capillaries

*do **not** accept capillaries / veins*

1

or

arteries

or

arterioles

1

dilate / widen

allow vasodilation

do not accept idea of blood vessels moving

note: marks are awarded independently

*accept shunt vessels close for **2** marks*

1

(c) (i) muscle contraction

ignore relaxing

*do **not** allow vasoconstriction*

1

(ii) respiration

(respiration) releases / produces heat

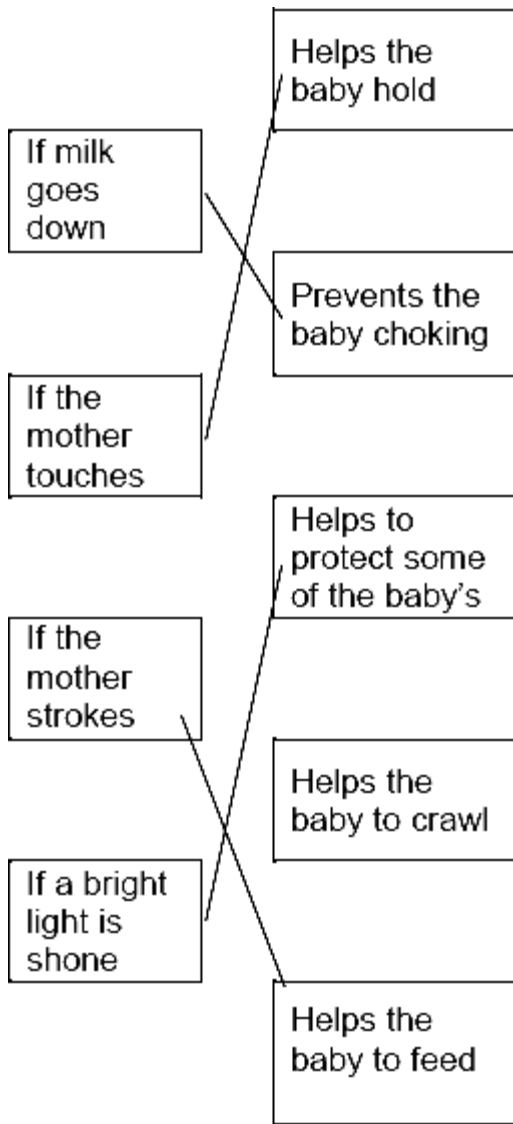
reference to respiration is required for this mark

1

[7]

31

(a)



all four correct = 4 marks
three correct = 3 marks
two correct = 2 marks
one correct = 1 mark
extra line from a statement cancels the mark

4

(b) glands

1

muscles

1 mark for each correct tick
each extra box ticked cancels 1 mark

1

[6]

- 32** (a) a drug taken for pleasure / fun
allow not taken as medicine
ignore recreational / legal / harmless / specific effects on body 1
- (b) (i) 45 1
- (ii) a cup of takeaway coffee 1
- (c) There is a link between drinking caffeine and hallucinations.
extra boxes ticked cancels the mark 1
- [4]**

- 33** (a) (i) thermoregulatory centre
allow thermoregulation centre
allow hypothalamus 1
- (ii) it has receptors
ignore receptors in skin 1
- reference to temperature of blood
allow plasma for blood 1
- (b) muscles contract
ignore relax / expand 1
- increased respiration **or** more heat released
allow more heat produced
if more not given allow respiration releases / produces heat 1
- (c) (i) (blood vessels / arteries / arterioles) dilate / widen
do not accept capillaries dilate
ignore blood vessels get bigger / expand
do not accept idea of blood vessels moving 1
- (ii) more blood close to / near surface
allow blood is closer to the surface
do not accept idea of blood vessels moving 1

more heat lost **or** heat lost faster **or** cools faster
do **not** allow for idea of evaporation

1

[8]

34

(a) (i) liver

1

(ii) kidney

*allow urethra / bladder**ignore ureter*

1

(iii) (excess) protein / named / amino acids

accept amino / ammonia

1

(b) less / no sweating

allow ideas of how sweat glands change in order to reduce sweating

1

less heat lost / evaporation

1

(c) (i) become narrower / constrict

*allow contract / get smaller etc**allow less blood flows through vessels**do not allow capillaries become narrower or reference to movement of vessels*

1

(ii) reduced / no heat loss

allow heat gained from room

1

[7]

35

(a) eye / sight / eyesight

either order

1

ear / hearing

ignore light

1

- (b) ear 1
- (c) (i) reflex 1
- (ii) neurons 1

[5]

36

- (a) (i) receptor 1
allow named receptor eg light receptor
ignore sensory neurone
allow sense organ / named sensory organ eg skin / eye
- (ii) sensory (neurone) 1
allow afferent
- (iii) motor (neurone) 1
allow efferent
- (iv) effector / muscle / gland / named 1
- (b) any **two** from: 2
- impulse / information passes from one neurone to another
or impulse / information passes across gap
 - chemical / transmitter involved
 - diffusion (across gap)

- (c) brain / person not aware of pain / stimulus / can't feel
allow brain/ person doesn't know / realise / unable to coordinate
ignore reflex
ignore information

1

- possibility of (permanent / serious) damage / eg burning
ignore danger

1

[8]**37**

- (a) respiration

*allow muscle contraction **or** muscle movement **or** exercise of muscles*

allow metabolism / chemical reactions

1

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

- less / no water (available) for sweat
allow dehydrated so less sweat
allow converse if evident that response refers to athletes who have drunk liquid
- less / no heat lost / less / no cooling
only need to refer to less / no once
- less / no evaporation (of sweat)

2

- (ii) **either**

blood vessels supplying the skin **or**

blood vessels in skin

*do **not** allow first mark if implied that skin capillaries dilate*

1

dilate / widen / muscles relax

ignore enlarge / open

vasodilation in skin = 2 marks

allow hairs lie flat for 1 mark

allow less insulation for 1 mark if linked to hairs

allow more blood in skin for 1 mark if no other marks awarded

1

- (c) (i) cold / 15°C cools the body / blood (more)
or reverse argument
ignore reference to values for body temperature derived from graph 1
- (ii) any **two** from:
- cools slower at 15°C cold / 15°C
allow converse arguments
 - cold / 15°C causes reduced blood flow to surface / skin
ignore reference to capillaries
 - blood not cooled as much / as quickly
 - cold / 15°C causes shivering
 - muscles contract / more respiration / heat made

2

[8]**38**

- (a) (i) receptor 1
- (ii) sensory neurone 1
- (iii) motor neurone 1
- (iv) muscle 1
- (b) (i) eye(s)
allow retina
ignore sight 1
- (ii) ear(s)
ignore hearing
*do **not** allow ear drum* 1

(iii) ear(s)
ignore balance

1

[7]