AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.5.2 THE HUMAN NERVOUS SYSTEM (PACK 1)

SCORE	PERCENTAGE
/307	%

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Q1.

(a) releasing saliva when food enters the mouth

1

withdrawing the hand from a sharp object

1

(b) bright light

allow described method of increasing light
ignore light unqualified
allow correctly named drug e.g. morphine / heroin

1

(c) iris

1

(d) muscle contraction

allow muscles shorten
ignore radial / circular
ignore muscles relax / constrict
*do **not** accept muscles expand*
*do **not** accept ciliary muscle contracts*

1

(e) **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

4–6

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1–3

No relevant content

0

Indicative content

- receptor detects stimulus
- e.g. receptor detects pressure
- receptor generates impulses / electrical signals

- neurones conduct impulses / electrical signals
- neurone A conducts impulses to spinal cord
- neurone A = sensory neurone
- synapse between neurones
- chemical (/ neurotransmitter) crosses synapse
- chemical stimulates impulse(s) in neurone B
- neurone B = relay neurone
- neurone C = motor neurone

- effector carries out response
- e.g. muscles of the arm / leg contract

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- muscles contract **or** gland secretes chemicals

to access **level 2**, candidates need to consider, in terms of the indicative content, the receptor, the neurones and the effector in the correct sequence

[11]

Q2.

(a) 2400 **and** 2280
or
500 **and** 380

1

120

1

*an answer of 120 scores **2** marks*

(b) respiration of glucose

1

(c) (more) sweating

ignore reference to vasodilation / vasoconstriction

1

(because) exercise releases heat
or
need to cool the body
or
need to lose heat
or
need to maintain body temperature

*do **not** accept energy being produced*

1

(d) more energy needed

*do **not** accept energy production*
*do **not** accept energy needed for respiration*

1

(so) more (aerobic) respiration

1

(so) increased breathing (rate / depth) (to supply oxygen **or** remove carbon dioxide / water)

1

'more' does not need to be stated a second time to gain marking point 1 and marking point 2

[8]

Q3.

(a) times are very short / in milliseconds
or
milliseconds cannot be
measured with a stopwatch

1

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(b) to increase validity / repeatability
or
to get representative results
allow to give a more reliable mean value
1

because of variation in results
allow to identify any anomalies
1

(c) (they have included) 468 / the 7th result
allow identification of anomaly in the table
1

(which) is anomalous / is a much higher value (than the others)
1

(d) $\frac{275}{259}$

1.06 (: 1)
*an answer of 1.06 (: 1) scores **2** marks*
1

*allow max **1** mark if wrong number of sig. figs.*
1

(e) 2.59×10^{-1} seconds
1

(f) any **two** from:
- cannot compare mean to **B** as it has been incorrectly calculated
- **C**'s mean reaction time is the longest, not the shortest
- only measured one type of reaction
  or
  cannot generalise to all reaction types
- other factors can influence reaction time
  allow examples

2

(g) involves (the conscious part of) the brain
allow voluntary (re)action
1

[11]

Q4.

(a) red blood cell
1

(b) 44
1

(c) retina
1

(d) **7** and **8** / the parents
do not have **A** (allele)
or only have **a** (allele) **or** are **aa**

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*allow converse – if parents had an **A** (allele) they would have Stickler syndrome*

1

so children cannot inherit **A**
or can only inherit **a**

or

the parents show the recessive characteristic

so must be homozygous
(recessive)
or must be **aa**
or parents cannot have **A**

1

(e) parental genotypes:
12 = Aa and 18 = aa
or parental gametes:
12 = A + a and 18 = a + a

1

derivation of offspring genotypes
allow ecf

1

identification of **Aa** offspring as Stickler

1

probability = 0.25 / $\frac{1}{4}$ / 1 in 4 / 25% / 1:3
*allow ecf – e.g. 0.5 if **12 = AA***
*do **not** accept 3:1*
*do **not** accept 1:4*

1

[9]

Q5.

(a) less sweating so less water loss

1

(as) no / little water available in desert

1

(b) (fat store) can be metabolised / respired to water

1

(little urine…) conserve water

1

(hard mouth) not damaged by spines on plants / on food
or
not damaged by hard / dry food

1

(c) dromedary / *C.dromedarius*

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and bactrian / *C. bactrianus*

no mark for the names, but must be identified

because

same genus

ignore 'both are Camelus'

1

(d) any **two** from:

- the fossil record
- oldest fossils in N. America

  or
- newer fossils in S. America / in Asia / in Africa

  *allow numbers for ages (45 Mya **and** 3 Mya / 6 Mya)*

- chemical / DNA analysis of living species

  allow radioactive dating of fossils

2

(e) isolation of separate camel populations by sea

or

by mountains

1

habitat variation / described between populations

allow examples – biotic (e.g. food / predators) or abiotic

1

genetic variation / mutation in each population

1

45 million years is sufficient time to accumulate enough mutations

1

natural selection

or

better adapted survive to reproduce

1

pass on favourable allele(s)

allow gene(s)

1

[14]

Q6.

(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

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(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]

Q7.

(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]

Q8.

(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

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

2

(b) 117

1

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

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]

Q9.

(a) (i) 2400 cm^3

1

(ii) 1400 (cm^3)

*allow **2** marks for ecf of correct answer to [answer given in (a)(i) – 1000]*

*allow **1** mark for 2400 – (600 + 400) or equivalent with no or incorrect answer*

*allow **1** mark for ecf of answer given in (a)(i) – 1000 or equivalent with no or incorrect answer*

2

(b) (i) sweat(ing)

allow evaporation

allow perspiration

1

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(ii) any **one** from:
- for cooling
- to maintain body temperature

1

(c) (i) More water was lost through the skin.

1

(ii) decrease

1

[7]

Q10.

(a) (i) receptor cells

1

(ii) eye(s)

accept retina

1

(b) (i) any **one** from:
- gender / sex
- quality of eyesight

  eg wearing glasses
- eg of factor that might affect reaction times

  eg alcohol consumption / distractions / tiredness / health / time of day / amount of practice (at this test)

  do not allow time / age

1

(ii) 182

allow 182.0

1

(iii) Any anomalies can be identified.

1

(iv) reaction time (too) long **or** reactions (too) slow

1

allow reaction time (too) slow

*allow examples of data quoted **or** derived from the table, eg (mean) reaction time for 90 year olds is 162 ms longer than for 75 year olds*

(so) more likely to have / cause an accident

1

[7]

Q11.

(a) receptors detect / sense stimuli / change in surroundings **or** convert stimulus into an impulse

ignore send impulses to brain / spinal cord

1

example of a receptor

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allow any appropriate organ or part of an organ, eg eye / retina or named type of receptor eg light receptor

1

effectors allow / make response **or** convert an impulse to an action

ignore receive impulses from brain / spinal cord

1

(effector) muscle / gland

allow an example

ignore eg arm / leg

1

(b) (i) junction

allow idea of a (small) gap / space

*do **not** allow if implication is that the neurones move*

1

between neuron(e)s

allow named types of neurones

1

(ii) chemical

allow answers in terms of specific types of neurone

allow neurotransmitter / named neurotransmitter released

1

any **one** from:

- (chemical released) from one neurone
  ignore produced
- (chemical) passes (across synapse) to next neurone to stimulate / cause (electrical) impulse
  allow diffuses for passes (across)

1

(c) (i) skin

ignore hand / leg

1

(ii) 1.6 (cm per millisecond)

allow 2 if evidence of rounding up of 1.6

1

(iii) any **two** from:

ignore length of neurones

- synapses slow down transmission / impulse
  allow idea of movement of chemical being slower than electrical impulse
- fewer synapses (via brain)
  *allow one synapse compared to two **or** only one synapse*
- (therefore) fewer delays
  allow impulse travels more slowly in relay neurones

2

[12]

Q12.

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(a) (i) The person started running a race.

1

(ii) 2300

1

(iii) drinking (water / sports drink)
or
through eating

1

(b) (i) brain

1

(ii) receptors

1

(c) cools us down

allow evaporates

1

[6]

Q13.

blood vessels supplying skin

1

constrict

allow vasoconstriction
*do **not** allow capillaries /veins constricting*
*do **not** allow moving blood vessel*

1

less blood flow (to / through capillaries / to skin)

allow blood flows further away from skin surface

1

so less energy is lost (to the surroundings)

allow less heat is lost

1

'shivering' by muscle (contraction)

allow muscles contract (and relax) rapidly

1

releasing energy **or** respiring (more)

allow 'heat produced'
*do **not** allow energy produced / made*
*do **not** allow energy **for** respiration*
allow sweating stops / reduces

ignore hair erection

1

[6]

Q14.

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(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]

Q15.

(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]

Q16.

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

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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]

Q17.

(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:

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- 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]

Q18.

(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

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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]

Q19.

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 <u>either</u> too high <u>or</u> 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

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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]

Q20.

(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

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(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]

Q21.

(a) sensory neurone

1

(b) (i) synapse

1

(ii) a chemical

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

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[5]

Q22.

(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]

Q23.

(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)

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1

[6]

Q24.

(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

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reduced insulin production so less glucose into cells / less glucose converted to glycogen

for 1 mark

1

[12]

Q25.

(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]

Q26.

(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

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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]

Q27.

(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]

Q28.

(a) (i) cerebral cortex

accept cerebrum / cerebral hemisphere

1

(ii) MRI (scan)

allow CAT / CT scan
*do **not** accept MIR*

or

electrode stimulation

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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]

Q29.

(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) <u>surface area</u> 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 <u>outer ones</u> insulate / act as barrier
- reducing <u>heat loss</u>

  allow reduced <u>cooling</u>

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- ‘share’ body warmth / heat

3

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

- size <u>of</u> 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 <u>all 3</u> 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 <u>less</u> rapidly (than ‘stand − alone’ tube)

comparison needed

1

penguins in a huddle lose <u>less</u> heat (than single ones)

accept ‘it is the same for penguins’

1

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

blood vessels <u>supplying the skin</u> (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 <u>supplying the skin</u> (capillaries) constrict / narrow

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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

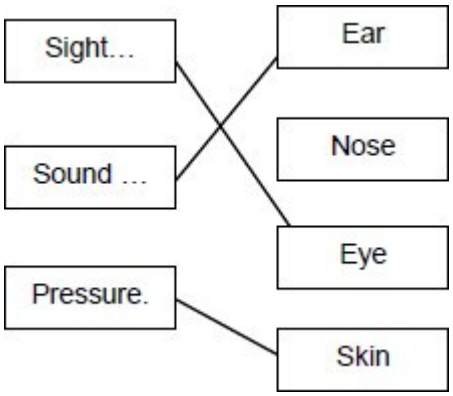
  *do **not** allow veins / capillaries*
- vessels supplying feet constrict / less blood to feet
- so temperature in feet cools / decreases
- more heat loss from large surface area or rapid flow of cold water over foot

3

[22]

Q30.

(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

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*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]

Q31.

(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]

Q32.

(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

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*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]

Q33.

(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*

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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]

Q34.

(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:

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- 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]

Q35.

(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]

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