

Mark schemes

- 1** (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]**
- 2** (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) $\sqrt{\frac{11.6}{490}}$ 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]

3

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]

4

- (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]

5

(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]

6

(a) (i) 1 hour 15 mins / 1.25 hours / 75 mins

allow 1:15

ignore 1.15 hours

1

(ii) increase in (core / body) temperature

ignore numbers

1

(due to an) increase in respiration **or** more muscle contraction

1

releasing energy (as a waste product)

allow produces 'heat'

*do **not** allow making energy*

1

skin temperature decreases

1

(because there is) sweating

1

(which) evaporates and cools the skin

ignore references to vasodilation or vasoconstriction

1

(iii) (there is) dilation of vessels (supplying skin capillaries)

allow vasodilation

allow blood vessels widen

ignore expand

*do **not** accept dilating capillaries or moving vessels*

1

(so) more blood flows (near skin) (surface) **or** blood is closer (to the skin)

ignore ref to heat

1

(c) pancreas detects (low) blood glucose

1

produces glucagon

do not allow glucagon made in the liver

1

(so) glycogen is converted to glucose

allow adrenaline released which increases conversion of glycogen to glucose

or

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

for 1 mark

1

[12]

7

(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]

8

(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]

9

(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]

10

(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]

11

(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]