

M1. (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]

M2. (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]

- M3.** (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]

- M4.** (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]

M5. (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]

- M6.** (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]

M7.

- (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]