

Cells and organisation

Total mark – 17

Question: 1

- 1 **Figure 1** shows a mole rat. Some of the mole rat's features are labelled.

Figure 1



Mole rats dig burrows underground and live in the burrows.

The body temperature of mole rats increases and decreases as the temperature of the burrows changes.

Draw **one** line from each feature of the mole rat to the best reason for the feature.

Do not use any reason or feature more than once.

[4 marks]

Feature

Eyes have poor sight

Whiskers

Long front teeth

No body hair

Reason for feature

Body temperature does not need to be controlled

Underground burrows are completely dark

Underground burrows have low levels of oxygen

Help to judge the width of the burrow

Used for digging burrows

Question	Answers	Extra information	Mark	AO / Spec. Ref.												
1	<table><thead><tr><th>Feature</th><th>Reason</th></tr></thead><tbody><tr><td>Eyes have poor sight</td><td>Body temperature does not need to be controlled</td></tr><tr><td>Whiskers</td><td>Underground burrows are completely dark</td></tr><tr><td>Long front teeth</td><td>Underground burrows have low levels of oxygen</td></tr><tr><td>No body hair</td><td>Help to judge the width of the burrow</td></tr><tr><td></td><td>Used for digging burrows</td></tr></tbody></table>	Feature	Reason	Eyes have poor sight	Body temperature does not need to be controlled	Whiskers	Underground burrows are completely dark	Long front teeth	Underground burrows have low levels of oxygen	No body hair	Help to judge the width of the burrow		Used for digging burrows	<p>one mark for the correct line from each feature</p> <p>if more than one line is drawn from a feature, do not award the mark for this feature</p>	4	AO2 1.4.1f
Feature	Reason															
Eyes have poor sight	Body temperature does not need to be controlled															
Whiskers	Underground burrows are completely dark															
Long front teeth	Underground burrows have low levels of oxygen															
No body hair	Help to judge the width of the burrow															
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Total			4													

Question: 2

1 Humans use the nervous system to react to changes in the environment.

1 (a) (i) Which word means a change in the environment?

Draw a ring around the correct answer.

[1 mark]

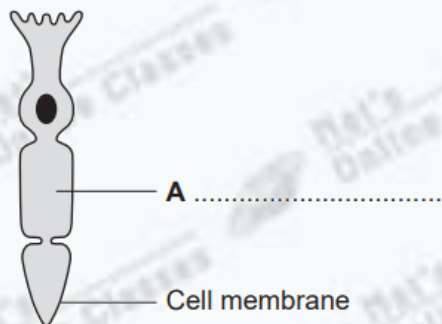
neurone

reflex

stimulus

1 (a) (ii) Figure 1 shows a light receptor cell.

Figure 1



Use the correct answer from the box to label part **A** on Figure 1.

[1 mark]

chloroplast

cytoplasm

vacuole

1 (b)

Figure 2 shows a boy riding a bicycle on a sunny day.

Figure 2



- 1 (b) (i) Receptors in the boy's body detect changes in the environment.

Complete **Table 1** to show which organ of the body contains the receptors for each change in the environment.

[3 marks]

Table 1

Change in the environment	Organ that contains the receptors
Sound of traffic from behind him	
Flashing blue lights of a police car	
Cooler air temperature in the shadows	

- 1 (b) (ii) The boy's response to danger is to pull on the bicycle brakes.

Which type of effector causes this response?

Tick (✓) **one** box.

[1 mark]

A gland

☐

A muscle

☐

A synapse

☐

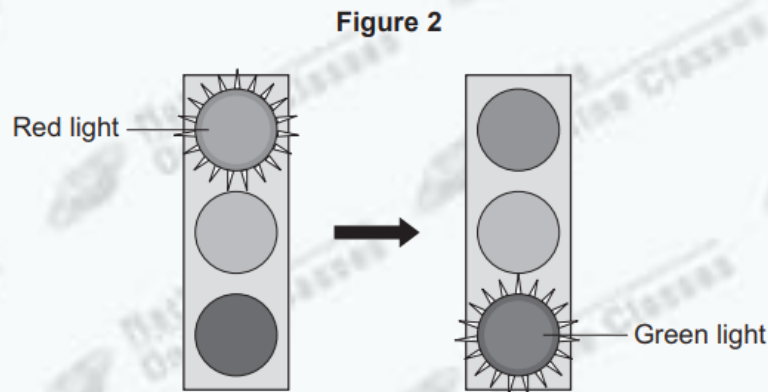
Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	stimulus		1	AO1 1.2.1b
1(a)(ii)	cytoplasm		1	AO1 1.2.1c
1(b)(i)	ear(s) eye(s) skin	in this order only	1	AO2 1.2.1b
		accept retina	1	
		ignore extra detail	1	
1(b)(ii)	A muscle		1	AO2 1.2.1e
Total			6	

Question: 3

- 2 Car drivers need quick reactions to avoid accidents.

A student uses a computer program to measure reaction time.
The computer screen shows a traffic light on red. The traffic light then changes to green.

Figure 2 shows the change the person sees on the computer screen.



When the traffic light changes to green the person has to click the computer mouse as quickly as possible.

The computer program works out the time taken to react to the light changing colour.

- 2 (a) Special cells detect the change in colour.

- 2 (a) (i) What word is used to describe special cells that detect a change in the environment?

[1 mark]

Draw a ring around the correct answer.

receptor cells

reflex cells

stimulus cells

- 2 (a) (ii) Where in the body are the special cells that detect the change in colour of the traffic lights?

[1 mark]

- 2 (b) The student used the computer program on one computer to measure the reaction times of people of different ages.

- 2 (b) (i) Give **one** variable the student should control so that a fair comparison can be made between the people of different ages.

[1 mark]

- 2 (b) (ii) The student did each measurement three times to calculate a mean value. **Table 1** shows the results.

Table 1

Age in years	Mean reaction time in milliseconds
15	242
30	
45	221
60	258
75	364
90	526

The reaction times for the 30-year-old person were **192**, **174** and **180** milliseconds.

Calculate the mean reaction time of the 30-year-old person.

[1 mark]

Mean reaction time = _____ milliseconds

- 2 (b) (iii) Which **one** of the following is an advantage of repeating each test three times and **not** doing the test just once?

[1 mark]

Tick (✓) **one** box.

Any anomalies can be identified.

☐

The results will be more precise.

☐

There will be no errors.

☐

2 (b) (iv) Some people think that old people should **not** be allowed to drive a car.

Why is it more dangerous for old people to drive cars?

Use information from **Table 1** to support your answer.

[2 marks]

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	receptor cells		1	AO1 1.2.1b
2(a)(ii)	eye(s)	accept retina	1	AO1 1.2.1b
2(b)(i)	any one from: <ul style="list-style-type: none">gender / sexquality of eyesighteg of factor that might affect reaction times	eg wearing glasses eg alcohol consumption / distractions / tiredness / health / time of day / amount of practice (at this test) do not allow time / age	1	AO3 1.2.1
2(b)(ii)	182	allow 182.0	1	AO2 1.2.1
2(b)(iii)	Any anomalies can be identified.		1	AO3 1.2.1

2(b)(iv)	reaction time (too) long or reactions (too) slow	allow reaction time (too) slow allow examples of data quoted or derived from Table1, eg (mean) reaction time for 90 year olds is 162 ms longer than for 75 year olds	1	AO3 1.2.1
	(so) more likely to have / cause an accident		1	
Total			7	