OXFORD

INTERNATIONAL AQA EXAMINATIONS

Topic Test: OxfordAQA International GCSE Biology 9201

Organisms interaction with the environment

Name: _____

Class: _____

Date: _____

Time: **79 minutes**

Marks: **79 marks**

Comments:

1 The nervous system allows humans to react to their surroundings.

(a) Sense organs have receptors. Receptors detect *changes in the environment.*

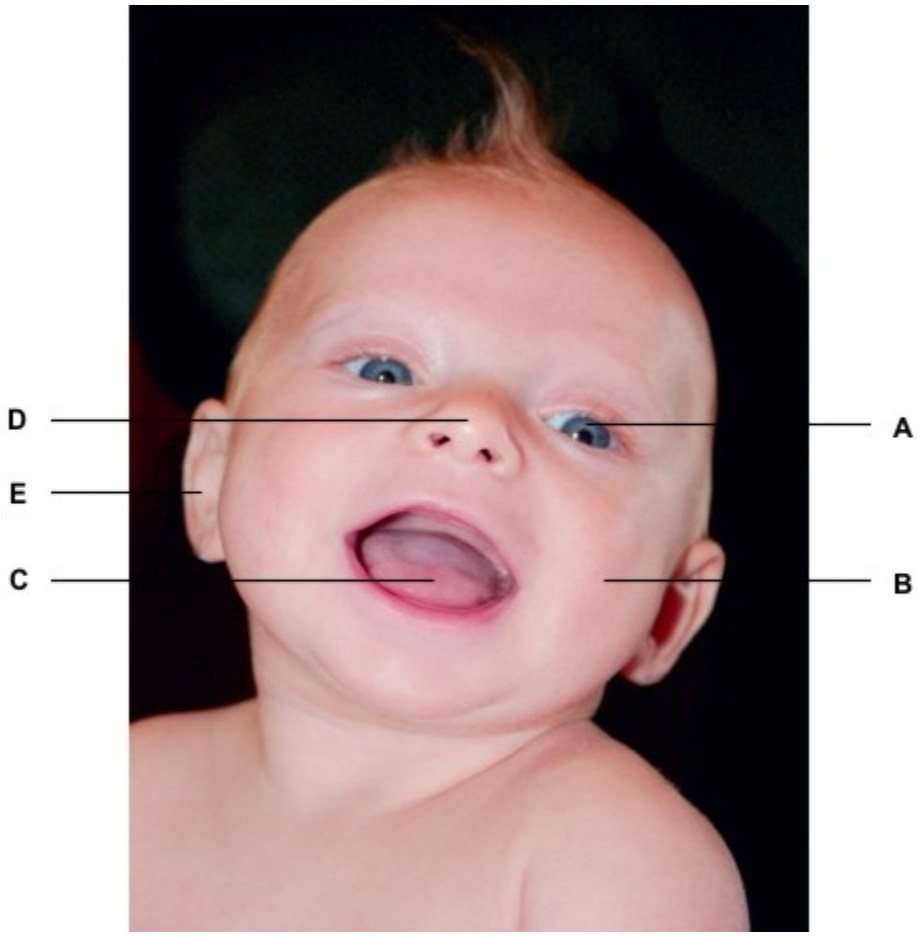
Which word describes *a change in the environment?*

Draw a ring around **one** answer.

an effector **a neurone** **a stimulus**

(1)

(b) The photograph shows a baby.
Labels **A**, **B**, **C**, **D** and **E** show some of the baby's sense organs.



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Answer each question by writing **one** letter, **A**, **B**, **C**, **D** or **E**, in each box.

(i) Which sense organ has receptors sensitive to light? ☐

(1)

(ii) Which **two** sense organs have receptors sensitive to chemicals?

☐ and ☐

(2)

(iii) Which sense organ has receptors sensitive to changes in the baby's position?

☐

(1)

(c) Information from sense organ **A** is passed along nerve cells.
The information is coordinated to produce a response.

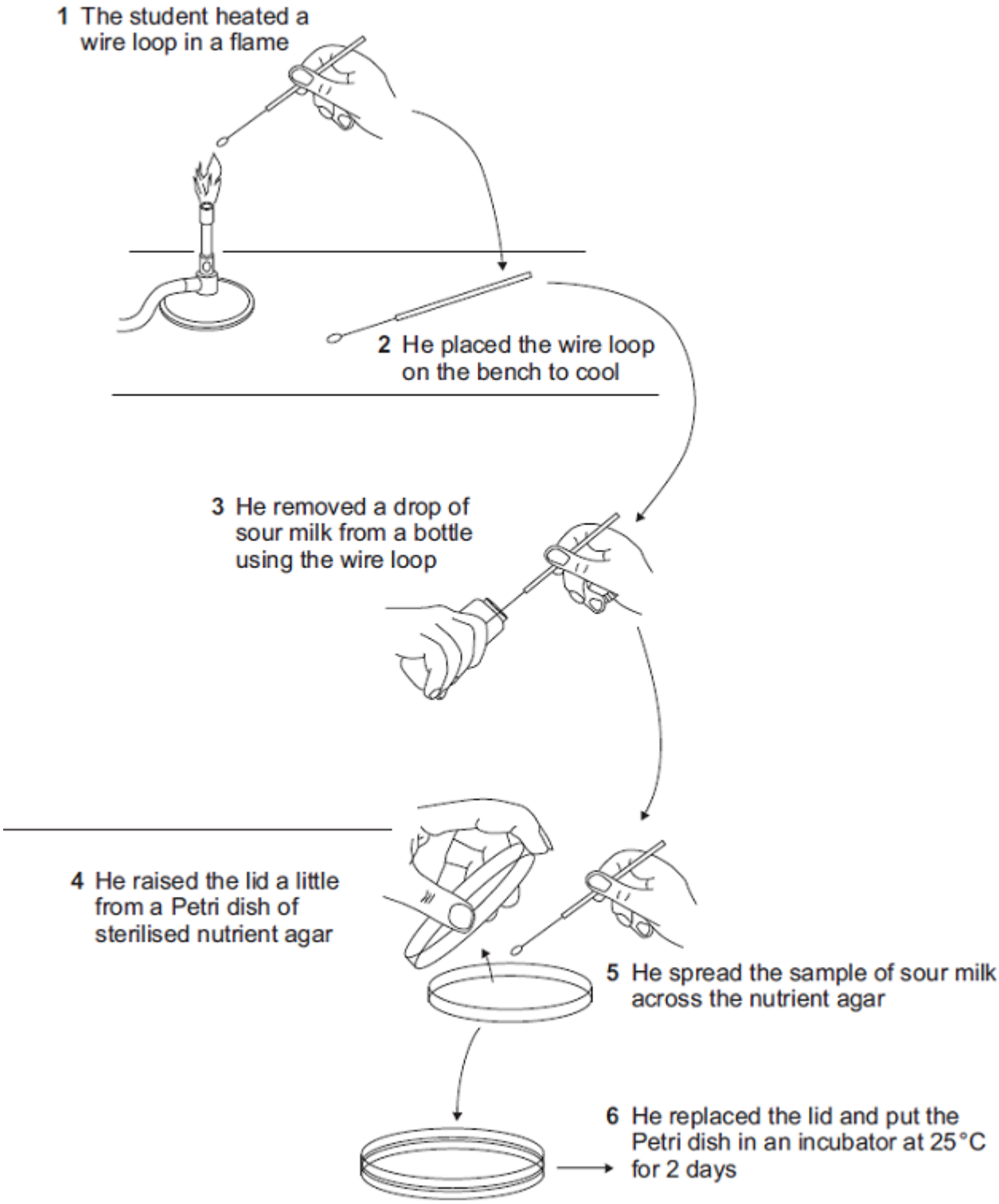
Which organ in the body coordinates the information?

_____

(1)

(Total 6 marks)

2 The diagram shows how a student transferred some sour milk from a bottle to a Petri dish of nutrient agar.



List A gives four actions carried out by the student.
List B gives five possible effects of these actions.

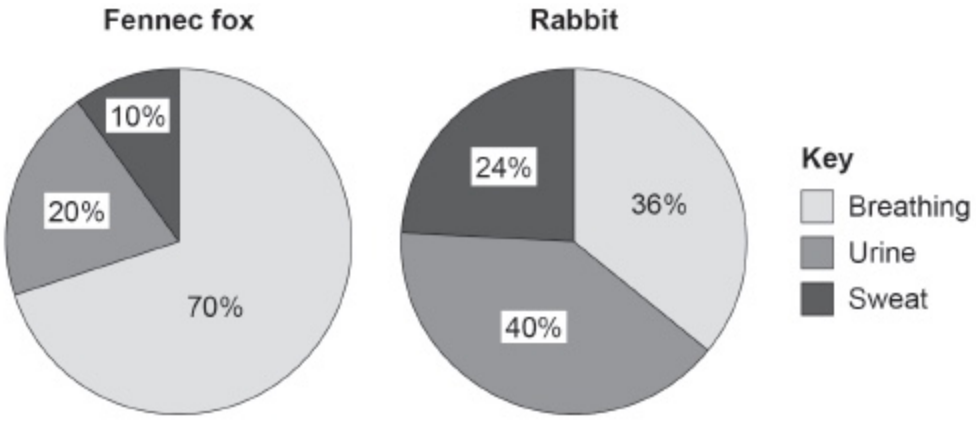
Draw a straight line from each action in **List A** to its effect in **List B**.
Draw only **one** line from each action.

List A – Action	List B – Effect
Heating loop in flame	Risk of contamination with bacteria increased
Placing loop on bench to cool	Fewer bacteria will enter
Only lifting lid of Petri dish a little	Kills bacteria
Placing Petri dish in incubator at 25°C	Prevents air entering
	Risk of growth of pathogens decreased

(Total 4 marks)

3 Animals have different adaptations to help them survive in their environments.

(a) The charts below shows the different ways that water is lost by a fennec fox and by a rabbit.



What proportion of water is lost in urine by the fennec fox compared to the rabbit?

Tick **one** box.

half ☐

2 times ☐

quarter ☐

4 times ☐

(1)

(b) Which organ detects changes in the water content of the blood?

Tick **one** box.

Brain ☐

Kidney ☐

Lung ☐

Skin ☐

(1)

(c) Name the hormone that controls the water content of the blood.

_____

(1)

(d) Most water in cells comes from food and drink.

Some chemical reactions in the body also produce water.

Name **one** chemical reaction in the body that produces water.

_____

(1)

(e) Urine contains the products from the breakdown of excess amino acids.

Describe how the liver breaks down amino acids for removal from the body.

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

4 The body controls internal conditions.

(a) Use words from the box to complete the sentences about water loss from the body.

kidneys	**liver**	**lungs**	**skin**

(i) Water is lost in sweat via the _____

(1)

(ii) Water is lost in urine via the _____

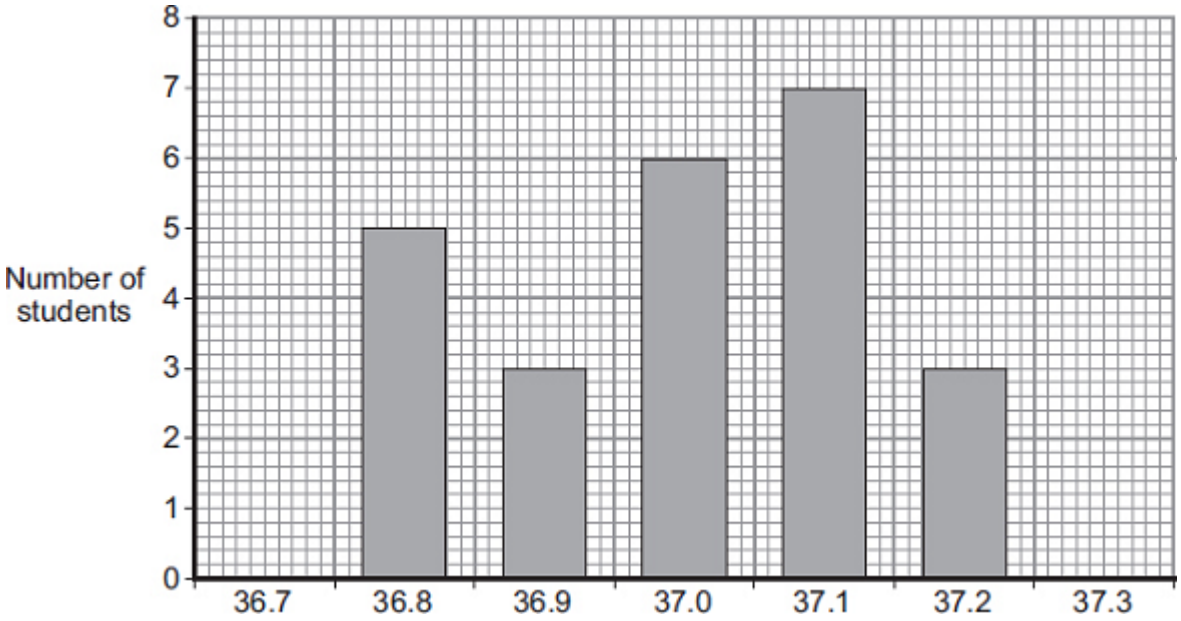
(1)

(iii) Water is lost in the breath via the _____

(1)

(b) Students investigated body temperature in the class.

The bar chart shows the results.



(i) One student used the bar chart to calculate the mean body temperature of the class. The student calculated the mean body temperature as 37.0 °C.

How did the student use the bar chart to calculate the mean?

_____

_____

_____

_____

(2)

(ii) How many students had a body temperature higher than the mean of 37.0 °C

_____

(1)

(iii) Body temperature must be kept within a narrow range.

Why?

_____

_____

(1)

(Total 7 marks)

5 Diabetes is a disease in which the concentration of glucose in a person's blood may rise to fatally high levels.
Insulin controls the concentration of glucose in the blood.

(a) Where is insulin produced?

Draw a ring around **one** answer.

gall bladder **liver** **pancreas**

(1)

(b) People with diabetes may control their blood glucose by injecting insulin.

(i) If insulin is taken by mouth, it is digested in the stomach.

What type of substance is insulin?

Draw a ring around **one** answer.

carbohydrate **fat** **protein**

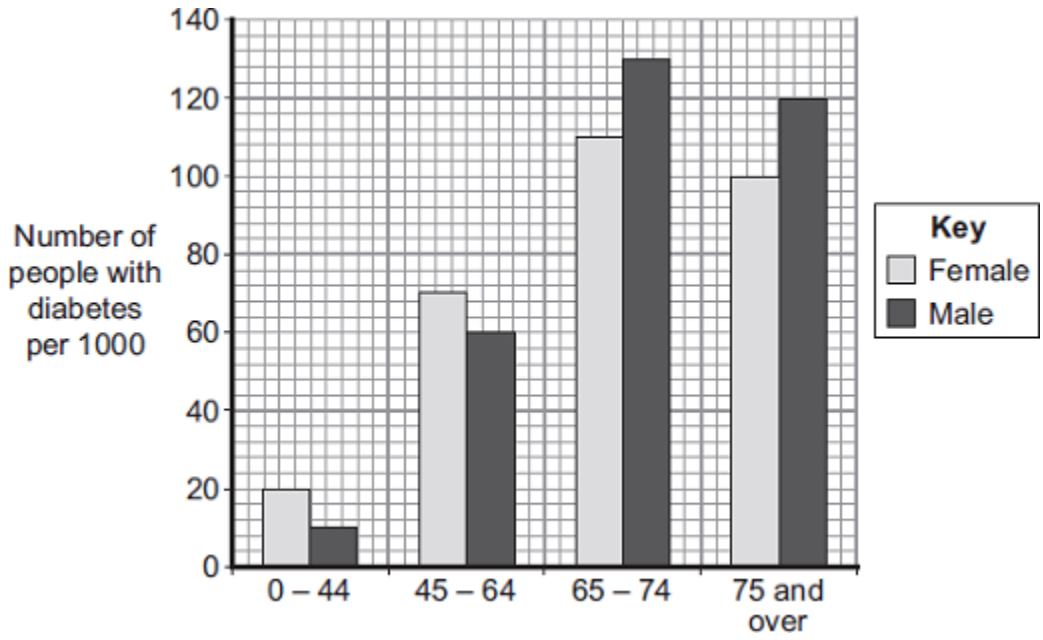
(1)

(ii) Apart from using insulin, give **one** other way people with diabetes may reduce their blood glucose.

_____

(1)

(c) The bar chart shows the number of people with diabetes in different age groups in the UK.



(i) Describe how the number of males with diabetes changes between the ages of 0 – 44 years and 75 years and over.

(3)

(ii) Compare the number of males and females with diabetes:

between the ages of 0 and 64 years

_____

_____

_____

over the age of 65 years.

_____

_____

_____

(2)

(Total 8 marks)

6 (a) Below are some examples of animal behaviour.

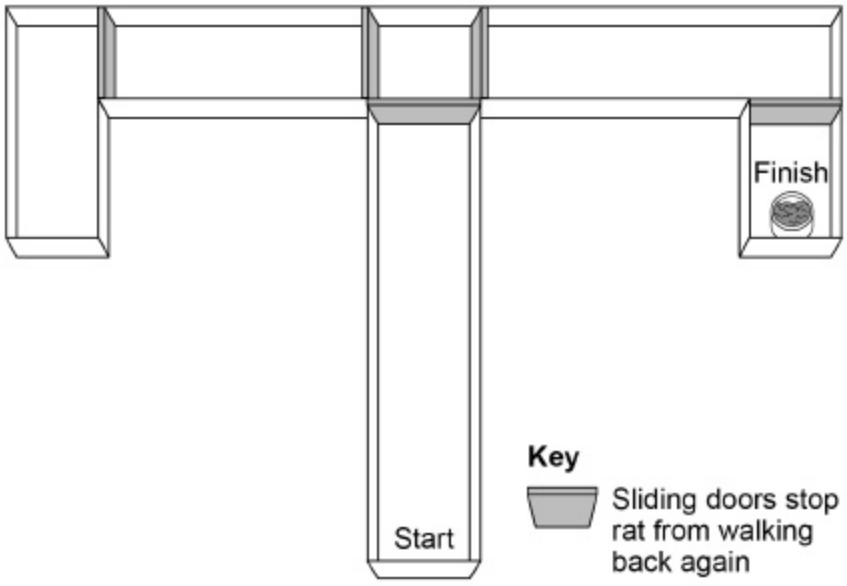
Draw **one** line from each example to the type of animal behaviour it demonstrates.

Example	Type of animal behaviour
A chick will follow the first moving object it sees as it hatches. After this it will only follow something that looks like the first object.	Classic conditioning
If a baby salamander is kept on its own away from water as it develops, when it is placed in water it will swim.	Habituation
Birds fly away when a farmer first fires a gun. If the farmer continues to fire the gun many times the birds will eventually ignore the noise.	Imprinting
	Innate
	Operant conditioning

(3)

(b) A scientist investigated if giving more food to rats encouraged them to learn at a faster rate. The scientist used a T-maze.

The diagram shows a T-maze.



The scientist found that:

After 1 day
- 58% of the rats chose the correct route no matter how much food they received at the finish.

After 5 days
- 70% of the rats which received one piece of food at the finish chose the correct route.
- 90% of the rats which received four pieces of food at the finish chose the correct route.

Describe a method using the T-maze that the scientist could use to get these results.

(4)

(c) Explain how the results demonstrate operant conditioning.

_____

_____

_____

_____

_____

_____

(3)

The table gives information about reproduction in three animals.

	Stickleback	**Turtle**	**Lion**
Type of animal	Fish	Reptile	Mammal
Number of young per breeding cycle	40	150	3
Parental behaviour	Adult keeps eggs and young in mouth	Eggs are buried in the sand and left to hatch	Young develop inside the mother's womb until birth
Aftercare of offspring	1 week	None	2.5 years
Offspring survival rate	30%	5%	50%

(d) Explain how the number of young in each breeding cycle and parental care relates to the offspring survival rate.

You should include advantages and disadvantages for each animal.

(6)

(Total 16 marks)

7 The kidneys remove waste materials from the liquid part of the blood.

(a) What name is given to the solution of waste stored in the bladder? _____

(1)

(b) The table shows the concentration of certain substances

- in the liquid part of the blood
- in the liquid that has just been filtered from the blood in the kidneys
- in the solution in the bladder.

SUBSTANCE	CONCENTRATION (%)		
	IN LIQUID PART OF BLOOD	IN LIQUID THAT HAS BEEN FILTERED IN THE KIDNEYS	IN LIQUID IN THE BLADDER
Protein	7.0	0	0
Salt	0.35	0.35	0.5
Glucose	0.1	0.1	0
Urea	0.03	0.03	2.0

(i) Which **one** of these substances does **not** pass into the liquid that is filtered in the kidneys?

_____

(1)

(ii) Suggest **one** reason why this substance does **not** pass out of the blood.

_____

(1)

(c) What happens to the glucose in the liquid that is filtered in the kidneys?

_____

(1)

(d) Explain why the concentration of urea in the liquid in the bladder is much greater than the concentration of urea in the liquid that is filtered in the kidneys.

_____

(1)

(Total 5 marks)

8 (a) Explain how diseases caused by bacteria are usually treated by doctors.

_____

_____

(2)

(b) Explain, as fully as you can, how white blood cells protect us from disease.

(5)

(Total 7 marks)

9 Humans maintain an almost constant body temperature.

(a) Describe the role of blood vessels in the control of body temperature.

(4)

(b) An athlete can run a marathon in 2 hours 15 minutes on a dry day in outside temperatures up to 35 °C.

If the air is dry, his body will **not** overheat.

In humid conditions the same athlete can run the marathon in the same time.
However, in humid conditions, if the outside temperature goes over 18 °C then his body **will** overheat.

Suggest an explanation for the athlete overheating in humid conditions.

_____

_____

_____

_____

_____

_____

_____

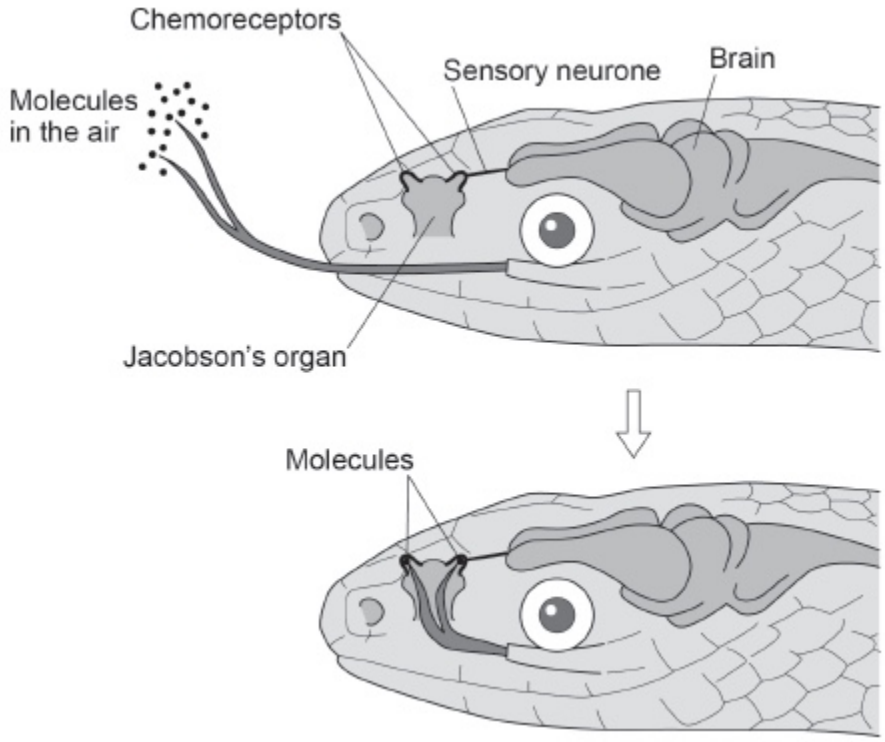
(3)

(Total 7 marks)

10 Snakes are almost blind. They have a specialised structure called the Jacobson's organ to help them detect molecules in the air. This helps snakes to detect prey.

The Jacobson's organ is located in the roof of the snake's mouth.

The diagram shows how the tongue brings the molecules to the Jacobson's organ.



(a) Suggest the role of chemoreceptors.

_____

_____

(1)

(b) Suggest **two** benefits for the snake of having a forked tongue.

1. _____

_____

2. _____

_____

(2)

(c) The pain withdrawal reflex action is important in humans. A finger will be pulled away rapidly after touching a hot surface.

Describe how the pathway from the Jacobson's organ to the brain is different from the pathway taken during the pain withdrawal reflex.

Use information from the diagram and your own knowledge.

(2)

(d) Suggest **one** reason why it is important that a reflex action is rapid.

(1)

Some snakes produce poisons which affect synapses.

(e) Describe what happens when an impulse reaches a synapse.

(2)

(f) The poison prevents an impulse being passed across the synapse.

Explain why people bitten by these snakes find it hard to inhale.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 12 marks)

1

(a) a stimulus

1

(b) (i) **A**

1

(ii) **C**

either order

1

D

1

(iii) **E**

1

(c) brain

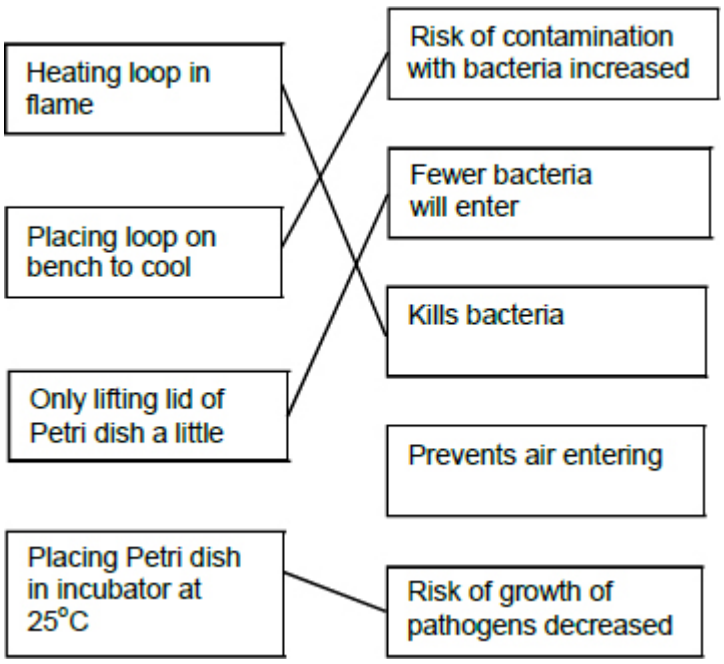
allow spinal cord / CNS / central nervous system

*do **not** allow spine*

1

[6]

2



any box on the left joined to > 1 other box - cancel

[4]

3

(a) half

1

(b) brain

1

(c) ADH

allow antidiuretic hormone

1

(d) (aerobic) respiration

do not allow anaerobic respiration

1

(e) deamination (of amino acids)

allow amino group removed

1

ammonia formed

1

(ammonia) converted into urea

1

[7]

4

(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]

5

(a) pancreas

apply list principle

1

(b) (i) protein

apply list principle

1

(ii) any **one** from:

- (controlling / changing) diet

  accept sugar(y foods) / named eg

  ignore references to starch / fat / protein / fibre

- exercise

  accept example, eg go for a run

- pancreas transplant

  accept named drug eg metformin

1

(c) (i) increase

ignore reference to women

1

then fall

1

relevant data quote (for male)

eg max at ages 65–74 ***or*** *starts at 10 (per thousand)* ***or*** *max at 130 (per thousand)* ***or*** *ends at 120 (per thousand)*

accept a difference between any pairs of numbers in data set

accept quotes from scale eg '130' or '130 per thousand' but ***not*** *'130 thousand'; to within accuracy of +/- 2 (per thousand)*

1

(ii) (between 0 and 64) more females (than males) **or** less males (than females)

ignore numbers

allow eg females more diabetic than males

1

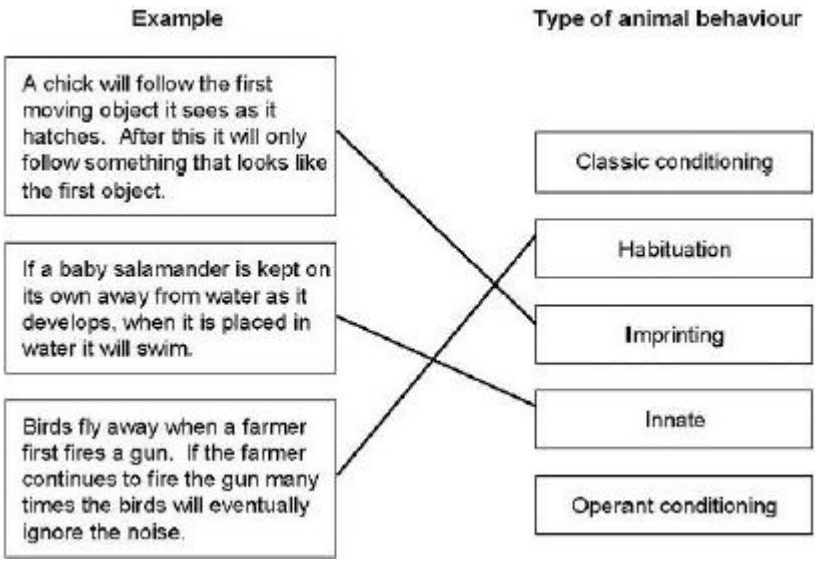
(over 65) more males (than females) or less females (than males)

allow eg males more diabetic than females

1

[8]

6 (a)



Extra information
one mark per correct response

more than one line from an example will cancel the mark

3

(b) any **four** from:

- use sample size of 20 or more rats
- (randomly) separate rats into 2 groups
- place 1 or 4 pieces of food at the finish according to the group
- put one rat at a time at the start (of T- maze)
- record if the rat reaches the food or not
- repeat every day for 5 days
- a relevant control variable

  example of a control variable:
  *same type/same size of food pieces **or** same diet prior to test/starved **or** same environmental noise **or** same age/type of rats*

- calculate percentage for each group (which took the correct route)

4 max

(c) rat learns to carry out activity/action

1

associated with reward/food

1

by trial and error

1

(d) **Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

stickleback example − mouth brooding **or** young kept in mouth for first week
Advantages:
- protection in early stages **or** first week increases survival rate (compared to turtle)
- resources required from parent **or** risk to parent are reduced

Disadvantages:
- only protected for first week
- low survival rate (compared to mammal)

Turtle example − egg laying **or** egg contains food for developing offspring
Advantages:
- no risk to parent **or** no further time **or** resources spent on offspring

Disadvantages:
- very low survival rate **or** lowest survival rate
- most die **or** get eaten
- parent has no way of increasing likelihood of offspring surviving
- relies upon innate behaviour **or** no learning from parent

Lion example − early development within mother (uterus)
Advantages:
- high level of parental care increases chances of offspring surviving **or** passing on genes to next generation **or** highest survival rate
- offspring have a reliable source of food **or** mother produces milk
- protection from predators
- taught how to avoid predators and where to find food etc.

Disadvantages
- mother at risk from starvation or disease **or** predators
- uses up a lot of mother's time and resources.

[16]

7 (a) urine

for 1 mark

1

(b) (i) protein

for 1 mark

1

(ii) e.g. molecules too large

for 1 mark

1

(c) reabsorbed into blood

for 1 mark

1

(d) e.g. most of water reabsorbed but little urea

for 1 mark

1

[5]

8 (a) use antibiotics; or named one to kill bacteria; (not microbes)

each for 1 mark

2

(b) some ingest/digest bacteria (not microbes) OWTTE
some produce antibodies;
which destroy bacteria/viruses;
some produce antitoxins;
which counteract poisons released by bacteria

each for 1 mark

5

[7]

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 near<u>er</u> 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 <u>released</u>

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) detect the chemicals

allow chemical stimuli

1

(b) any **two** from:

- increased surface area (for contact with receptors)
- can sense/detect molecules/chemicals from different areas/places
- to identify position/direction of prey/mate/shelter etc

2

(c) any **two** from:

allow converse if made clear

- to brain and not to spinal cord
- no synapses
- no relay neurone (involved)
- no motor neurone (involved)

2 max

(d) avoid danger/damage (to the body)

1

(e) chemical released from one neurone

allow neurotransmitter

1

which passes/diffuses to the next neurone

1

(f) impulse won't reach motor neurone

1

so intercostal muscles/diaphragm muscle won't contract

1

(so) the rib cage/diaphragm will not move

1

(and therefore) air will not be moved into the lungs

*allow no increase in volume **or** decrease in pressure*

1

[12]