



Write your name here

Surname

Other names

# 13+ Scholarship Paper 2024

**Subject: Biology**

**Time: 1 hour**

**You must have:**

Pen  
Pencil

**Total Marks**

60

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name.
- Answer the questions in the answer sheets provided.
  - *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

## Information

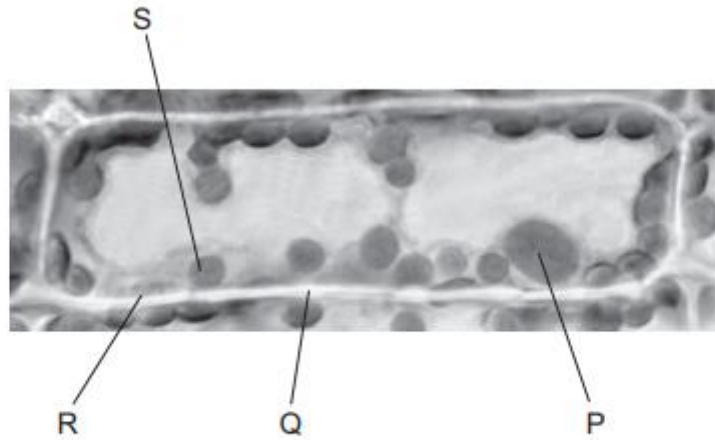
- The total mark for this paper is 70
- The marks for each question are shown in brackets
  - Use this as a guide as to how much time to spend on each question.

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

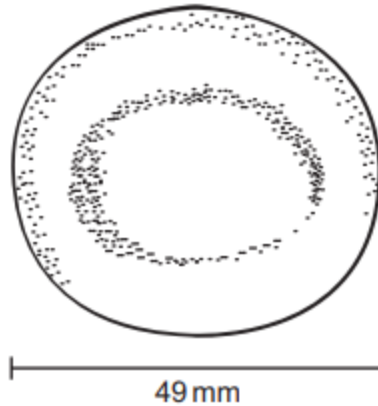


1. The photomicrograph shows a cell from a type of aquatic plant.



Which labelled parts indicate that this is a plant cell?

2. The diagram shows a red blood cell.



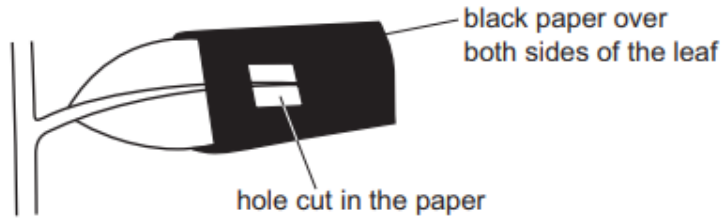
The actual diameter of the cell is 7.0 micrometres.

What is the magnification of this cell?

- A**  $\times 70$       **B**  $\times 700$       **C**  $\times 7000$       **D**  $\times 70000$


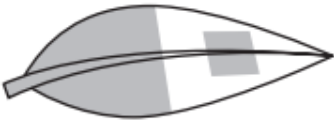
3.

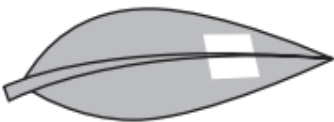

A plant is placed in the dark until all its stored starch is used up. The plant is placed in light with black paper over part of one green leaf.



After eight hours, the leaf is tested for starch.

Which diagram shows the appearance of the leaf after this test?

**A**  **B** 

**C**  **D** 

key  
■ = starch present  
□ = starch **not** present

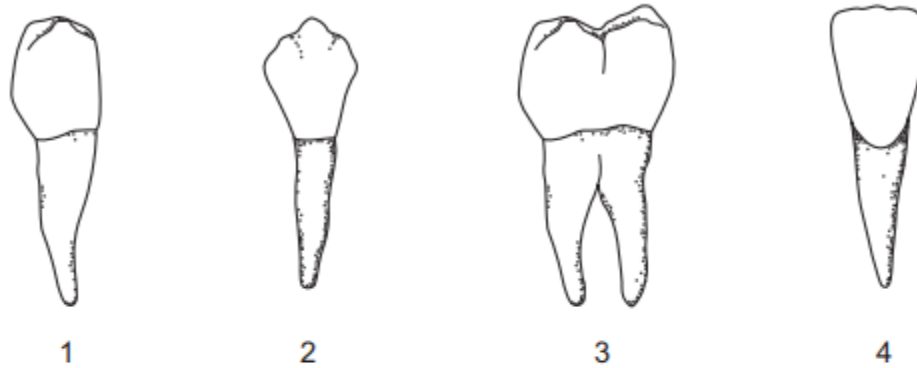
4. What is the order of flower parts through which the pollen tube must grow to reach the egg cell nucleus during fertilisation?

- A** stigma → style → ovule → ovary
- B** stigma → style → ovary → ovule
- C** style → stigma → ovule → ovary
- D** style → stigma → ovary → ovule

5. Which factor would **decrease** the rate of diffusion of oxygen into cells?

- A** increasing concentration gradient
- B** increasing surface area
- C** increasing temperature
- D** increasing thickness of cell membrane

6. The diagrams show the different types of human teeth.



Which teeth are used for grinding food?

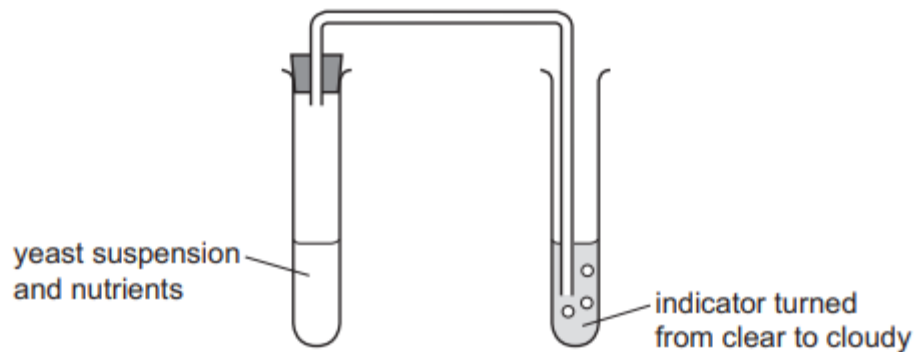
	1	2	3	4	
<b>A</b>	✓	x	✓	x	key ✓ = yes x = no
<b>B</b>	✓	✓	x	x	
<b>C</b>	x	x	✓	✓	
<b>D</b>	x	✓	x	✓	

7. What is defined as a disease-causing organism?

- A bacterium
- B pathogen
- C phagocyte
- D virus

8. A student investigated the effect of temperature on respiration in yeast.

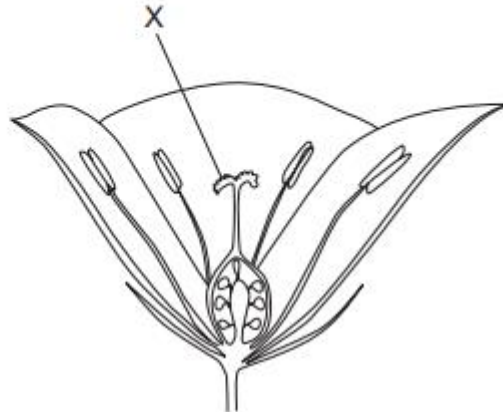
The diagram shows the apparatus they used.



Which substance turned the indicator from clear to cloudy?

- A carbon dioxide
- B glucose
- C oxygen
- D water

9. The diagram shows part of a flower.



What is the part labelled X?

- A** anther
  - B** ovary
  - C** sepal
  - D** stigma
10. Vitamin A deficiency is a big health problem in some parts of the world and can cause problems such as blindness. Rice can be genetically modified to enable people to make vitamin A when they eat it.
- 150 g of this rice provides 60% of the adult recommended daily intake of vitamin A.
- How much rice does an adult need to get 100% of the recommended daily intake of vitamin A?
- A** 190g      **B** 210g      **C** 250g      **D** 375g

11. Some animals live in cold places. They sometimes huddle together as shown in Fig. 1.1.



**Fig. 1.1**

A student investigated the effect of huddling on heat loss from model animals.

Test-tubes containing hot water represented the animals.

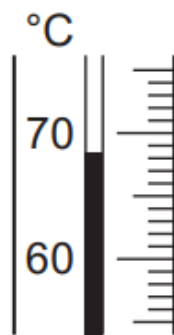
The student used the method described in step 1 to step 10.

Step 1 Place a test-tube in an empty beaker and put a thermometer into the test-tube.

Step 2 Approximately half-fill the test-tube with hot water and start the stop-clock.

Step 3 After one minute record the temperature of the hot water in the test-tube.

Fig. 1.2 is a diagram of part of the thermometer from step 3.



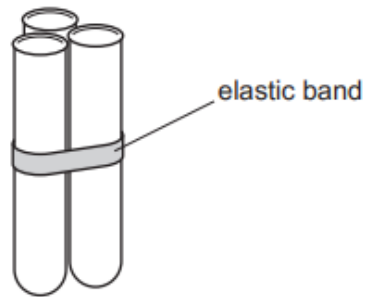
**Fig. 1.2**

- (a) (i) Record the temperature shown in Fig. 1.2.

..... °C [1]

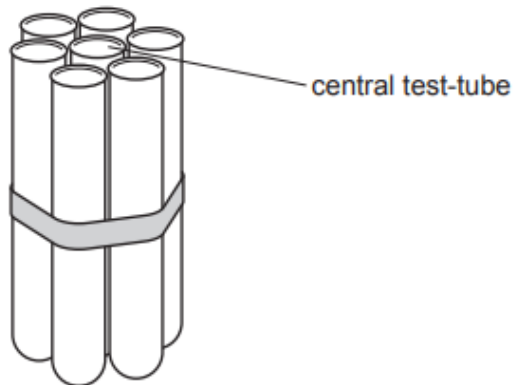


- Step 4 Record the temperature of the hot water in the test-tube every minute for a total of five minutes.
- Step 5 Put three identical test-tubes together and keep them in place with an elastic band, as shown in Fig. 1.3. Place the group of three test-tubes in an empty beaker.



**Fig. 1.3**

- Step 6 Half-fill all three test-tubes with hot water and put a thermometer into one of the test-tubes.
- Step 7 Record the temperature in the test-tube at one minute intervals for a total of five minutes.
- Step 8 Put seven identical test-tubes together and keep them in place with an elastic band, as shown in Fig. 1.4. Place the group of seven test-tubes in an empty beaker.



**Fig. 1.4**

- Step 9 Half-fill all seven test-tubes with hot water and put a thermometer into the central test-tube.
- Step 10 Record the temperature in the test-tube at one minute intervals for a total of five minutes.

Fig. 1.5 shows the results the student recorded in their notebook.

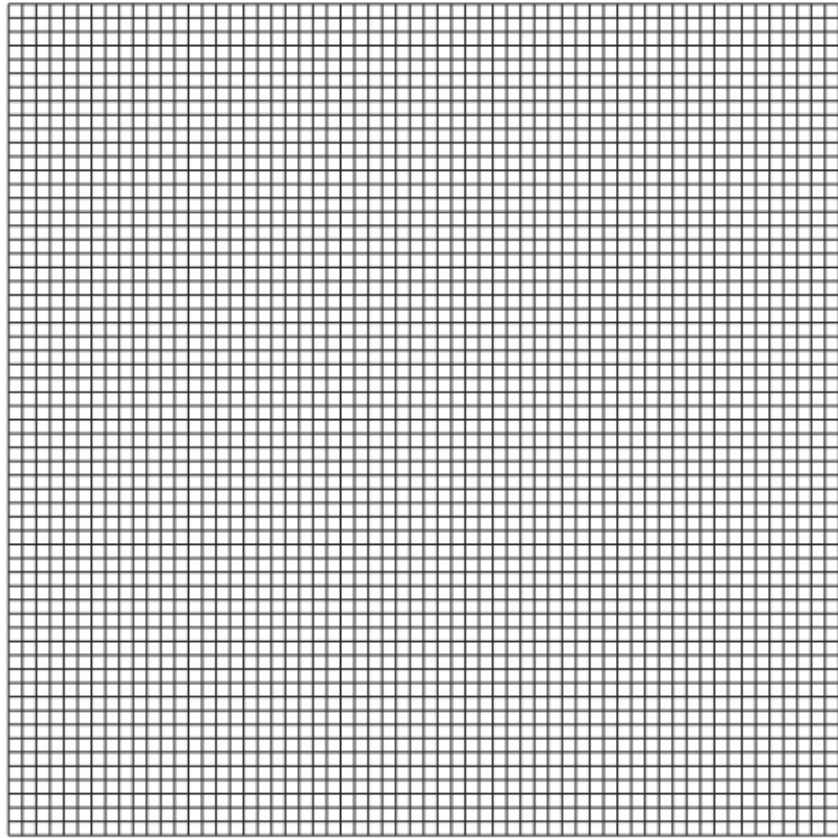
one test-tube:	three test-tubes:	seven test-tubes:
1 minute =	1 minute = 67	1 = 73°C
2 = 65	2 = 64	2 = 73
3 = 61	3 = 62	3 = 73
4 = 58	4 = 61	4 = 72
5 = 55	5 = 60	5 = 72

Fig. 1.5

(ii) Prepare a table and record the results shown in Fig. 1.5 and your answer to 1(a)(i).

[3]

- (iii) Plot a line graph on the grid of temperature against time. Include all three sets of data from your table in 1(a)(ii) and a key.



[5]

- (iv) State **two** conclusions for this investigation.

1 .....

.....

.....

2 .....

.....

.....

[2]

- (v) State **two** variables that were kept constant during this investigation.

1 .....

2 .....

[2]

13+ Scholarship

(vi) Suggest **two** possible sources of error in this investigation.

1 .....

.....

2 .....

.....

[2]

(vii) Suggest **one** improvement to the method that was used in this investigation.

.....

.....

..... [1]

(viii) Identify **one** hazard for this investigation.

.....

.....

..... [1]

12. (a) (i) Keys can be used to identify a species.

State the name of the type of key that uses paired choices of features.

..... [1]

- (ii) Fig. 1.1 shows drawings of six different birds and their names.

*Ammodramus bairdii*



*Buceros rhinoceros*



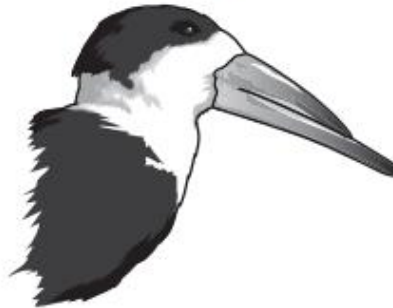
*Pandion haliaetus*



*Haliaeetus leucocephalus*



*Rynchops niger*



*Recurvirostra avosetta*



not to scale

Fig. 1.1

Use the key to identify the birds in Fig. 1.1.

Complete Table 1.1 by writing the letters of the birds **A** to **F** in the correct box.

		key	letter of the bird
1	(a) (b)	beak is longer than the head beak is shorter than the head	go to 2 go to 3
2	(a) (b)	beak curves upwards beak does <b>not</b> curve upwards	<b>C</b> go to 4
3	(a) (b)	top part of the beak is hooked over the bottom part of the beak top part of the beak is <b>not</b> hooked over the bottom part of the beak	go to 5 <b>E</b>
4	(a) (b)	top part of the beak is shorter than bottom part of the beak has a large projection above the beak	<b>A</b> <b>B</b>
5	(a) (b)	head has a stripe head does <b>not</b> have a stripe	<b>F</b> <b>D</b>

**Table 1.1**

name of the bird in Fig. 1.1	letter of the bird in the key
<i>Ammodramus bairdii</i>	
<i>Buceros rhinoceros</i>	
<i>Pandion haliaetus</i>	
<i>Haliaeetus leucocephalus</i>	
<i>Rynchops niger</i>	
<i>Recurvirostra avosetta</i>	

[5]

(iii) State **two** features of birds, other than the beak, that can be used to classify them as birds.

1 .....

2 .....

[2]

(b) The population size of the avocet bird (*Recurvirostra avosetta*) was reduced to zero in one country. After more than 100 years, conservation has helped the number of avocet birds in this country to increase again.

(i) State the genus of the avocet bird.

..... [1]

(ii) In one area of this country, avocet bird numbers have increased from 25 birds to 2000 birds in 30 years.

Calculate the percentage increase in avocet bird numbers.

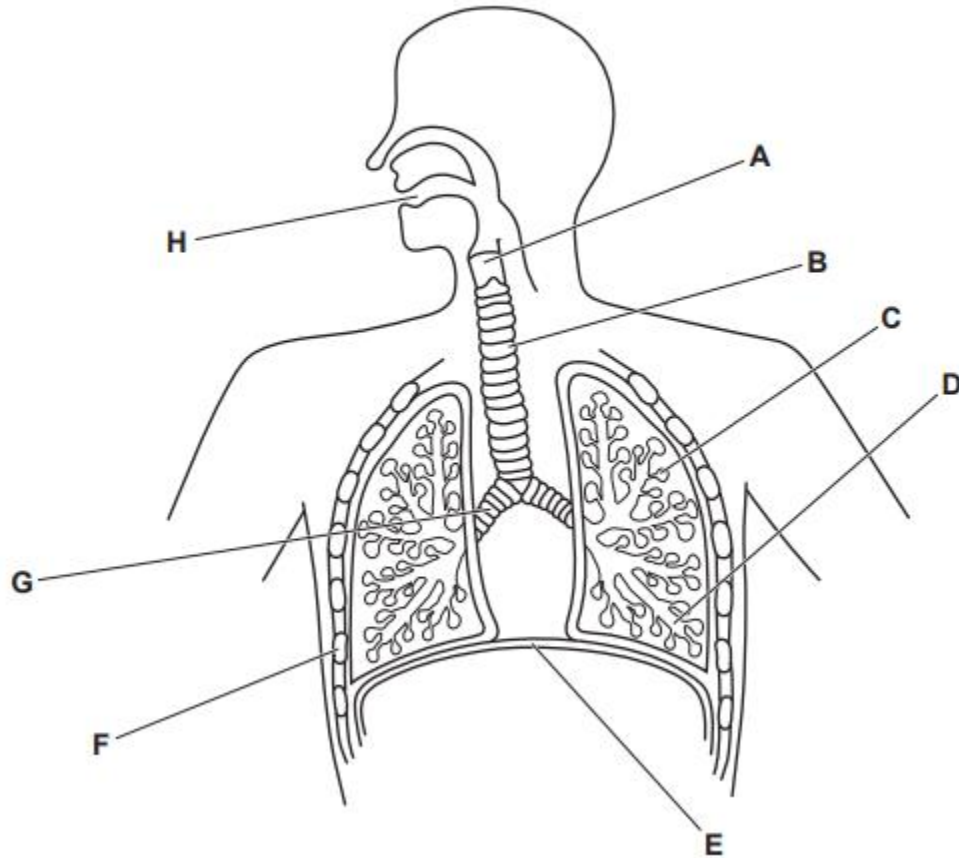
Space for working.

.....%  
[2]

(iii) Explain why organisms such as the avocet bird become endangered or extinct.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

13. Fig. 5.1 is a diagram of the breathing system in humans.



(a) State the names of the parts labelled **A**, **D** and **E** in Fig. 5.1.

**A** .....

**D** .....

**E** ..... [3]

(b) Part **B** in Fig. 5.1 contains specialised cells that move mucus.

State the name of these specialised cells.

..... [1]

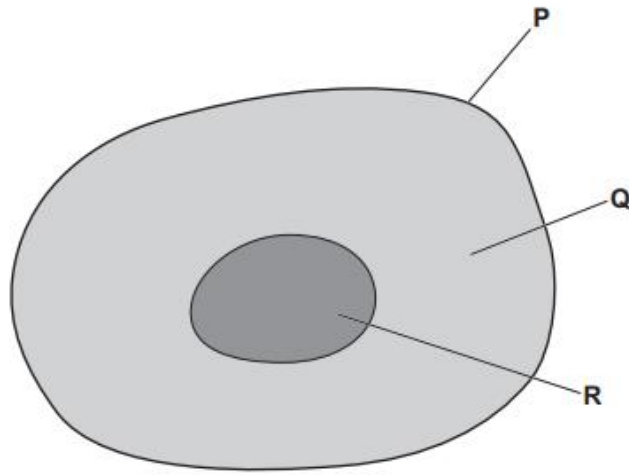
(c) State the letter of a part shown in Fig. 5.1 that also has a role in digestion and name **one** type of digestion that occurs here.

letter .....

type of digestion ..... [2]



14. (a) Fig. 7.1 is a diagram of an animal cell.



**Fig. 7.1**

Complete Table 7.1 by stating the functions of the structures labelled in Fig. 7.1.

**Table 7.1**

structure label	function of the structure
<b>P</b>	
<b>Q</b>	
<b>R</b>	

[3]

13+ Scholarship

- (b)** Cell structure can be specialised to perform a specific function. A range of animal cell types are shown in Fig. 7.2.

The boxes on the left contain the names of four specialised cells.

The boxes in the middle contain diagrams of different specialised cells.

The boxes on the right contain descriptions of functions.

Draw **one** line from each name of a specialised cell to the diagram of that cell.

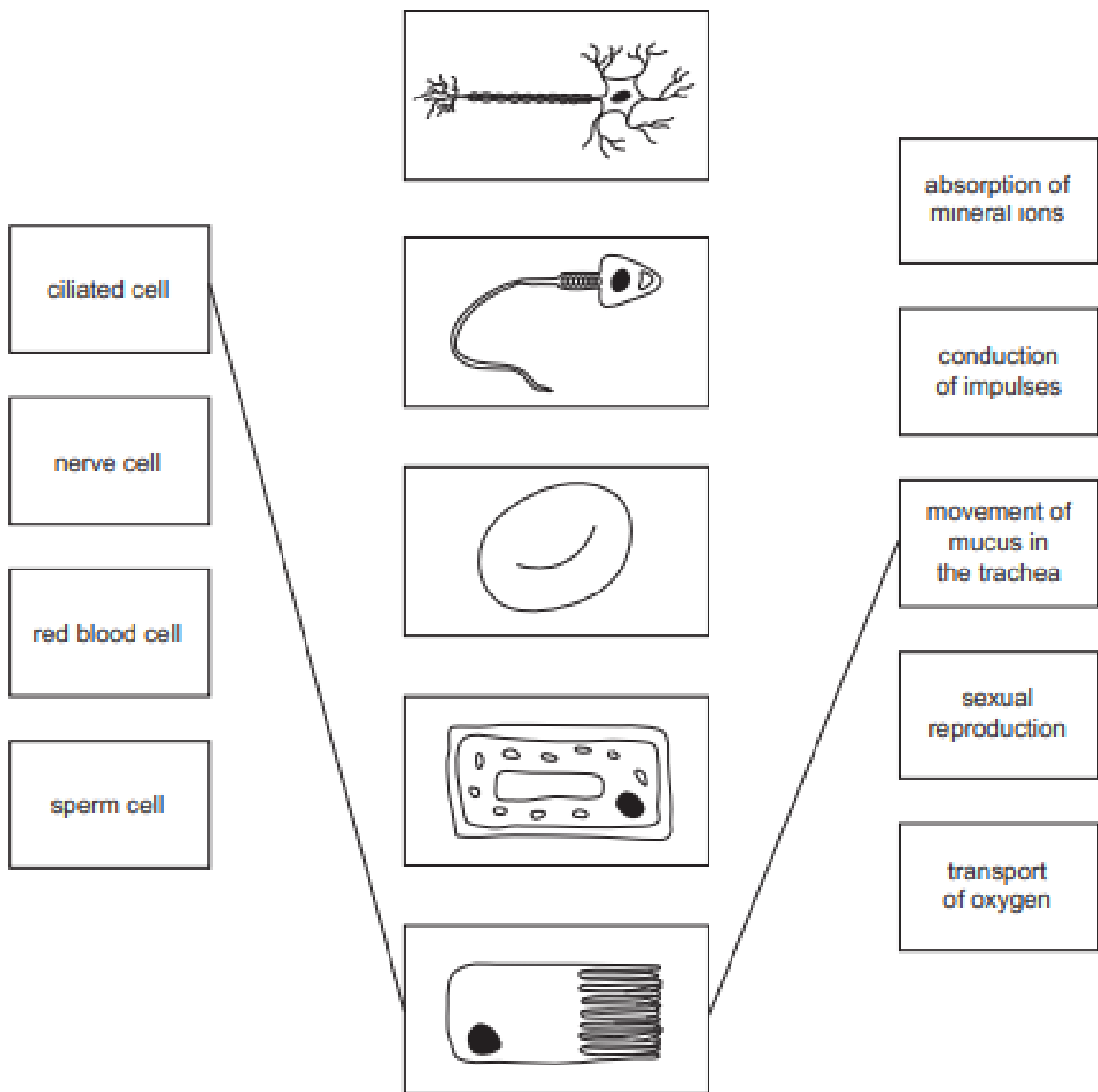
Draw **one** line from each diagram of a specialised cell to its function.

Two lines have been drawn for you. Draw **six** more lines.

**specialised cell names**

**specialised cell diagrams**

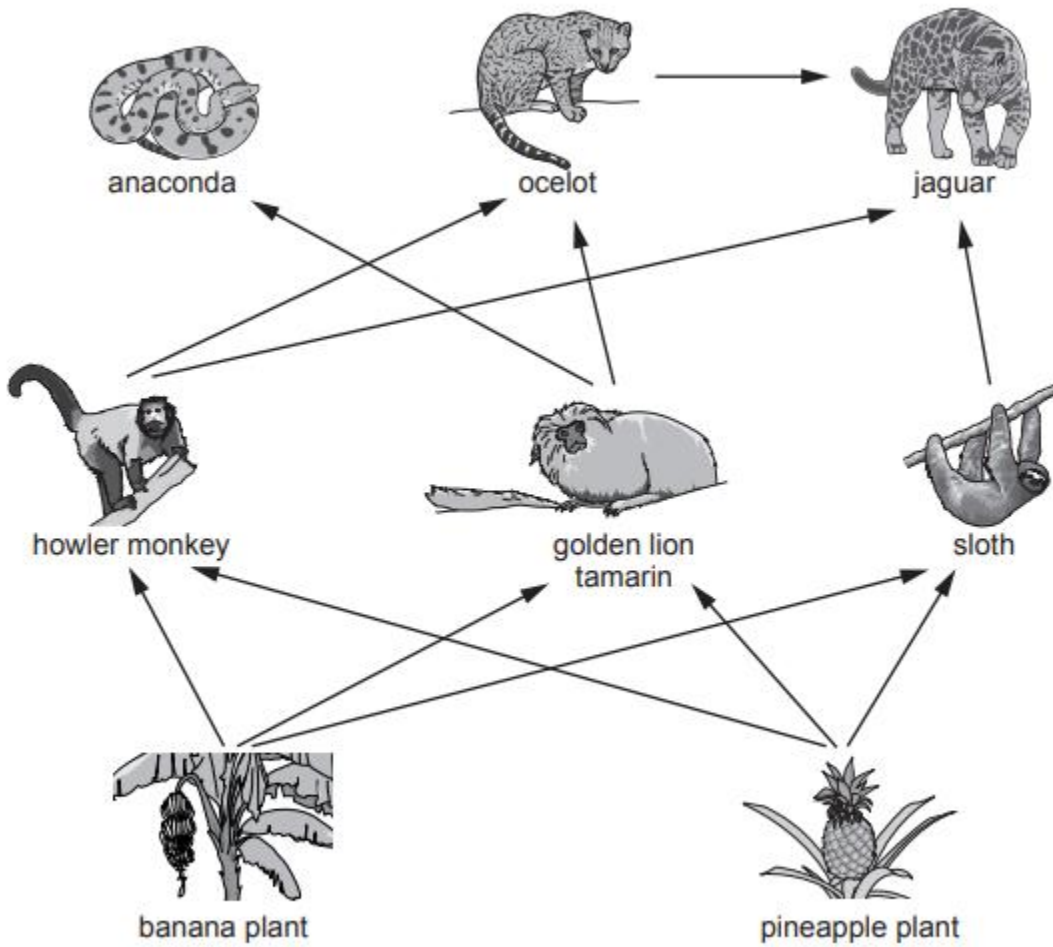
**functions**



**Fig. 7.2**

[6]

15. Fig. 4.1 is a drawing of a rainforest food web.



not to scale

- (i) State the name of **one** producer shown in Fig. 4.1.  
..... [1]
- (ii) State the name of **one** herbivore shown in Fig. 4.1.  
..... [1]
- (iii) State the number of carnivore species shown in Fig. 4.1.  
..... [1]