

Students are to research on **Carbon cycle, Water cycle and Nitrogen cycle.**

Presentations should include images, videos, and written matter which includes the points given below:

1. Carbon cycle

Describe the carbon cycle, limited to photosynthesis, respiration, feeding, decomposition, fossilization and combustion

Discuss the effects of the combustion of fossil fuels and the cutting down of forests on the carbon dioxide concentrations in the atmosphere

Extension – what is meant by ‘carbon neutral’

2. Water cycle

Describe the water cycle, limited to evaporation, transpiration, condensation and precipitation

3. Nitrogen cycle

Describe the nitrogen cycle in terms of:

- decomposition of plant and animal protein to ammonium ions
- nitrification
- nitrogen fixation by lightning and bacteria
- absorption of nitrate ions by plants
- production of amino acids and proteins
- feeding and digestion of proteins
- deamination
- denitrification

State the roles of micro-organisms in the nitrogen cycle, limited to decomposition, nitrification, nitrogen fixation and denitrification (generic names of individual bacteria, e.g. *Rhizobium*, are not required)

Note: Refer to search engines / newspaper / reference books and prepare a power point presentation. The presentation should include a) Introduction with title of project, student information, name of the school and academic session b) Acknowledgements c) Content with relevant headings d) Summary e) Bibliography

Characteristics and Organization of the Organism

Solve the following worksheet:

- 1 A biologist made a slide of some epidermal cells from a scale leaf of an onion bulb.

Fig. 4.1 is a drawing that the biologist made of one of the cells.

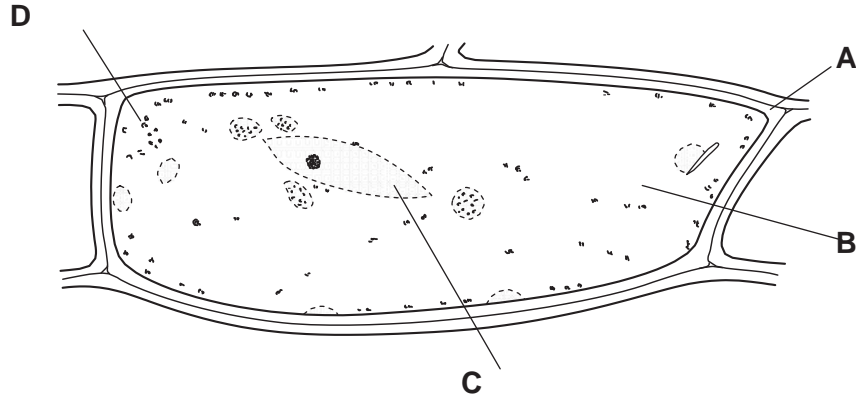


Fig. 4.1

- (a) Table 4.1 shows the functions of the structures within a plant cell.

Complete the table by:

naming the part of the cell that carries out each function

using the letters from Fig. 4.1 to identify the part of the cell named.

Table 4.1

function	letter from Fig. 4.1	name
resists the turgor pressure of the cell		
controls the activities of the cell		
site of the chemical reactions of the cell including synthesis of proteins		

- (b) The biologist added a few drops of concentrated salt solution to the cells on the slide and took a photograph of the cells, as shown in Fig. 4.2.

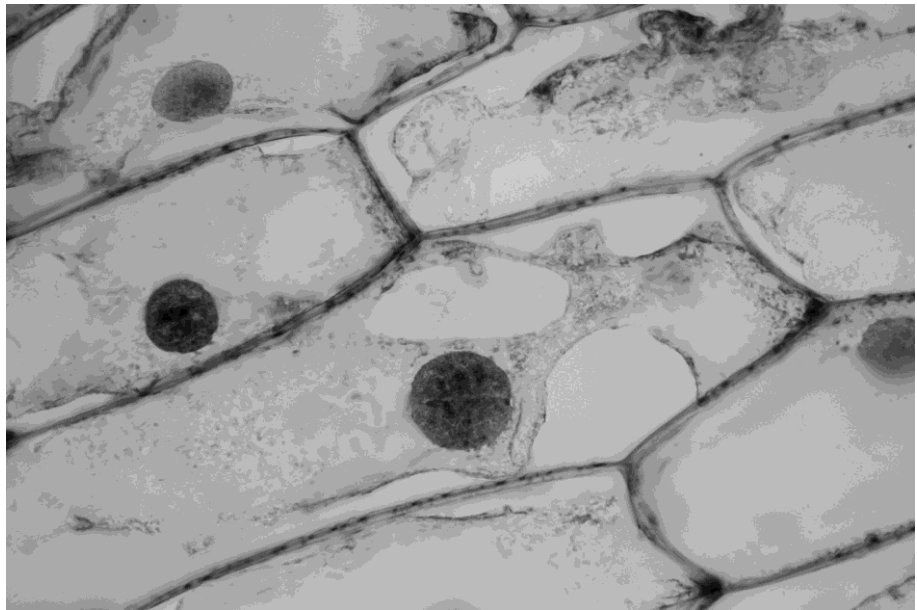


Fig. 4.2

- (i) With reference to Fig. 4.2, describe the effect on the plant cells of adding a concentrated salt solution.

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.....[3]

- (ii) Use the term **water potential** to explain the effect you have described.

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.....[3]

[Total: 9]

2 Fig. 3.1 shows images of red blood cells from a human, **A**, and a bird, **B**.

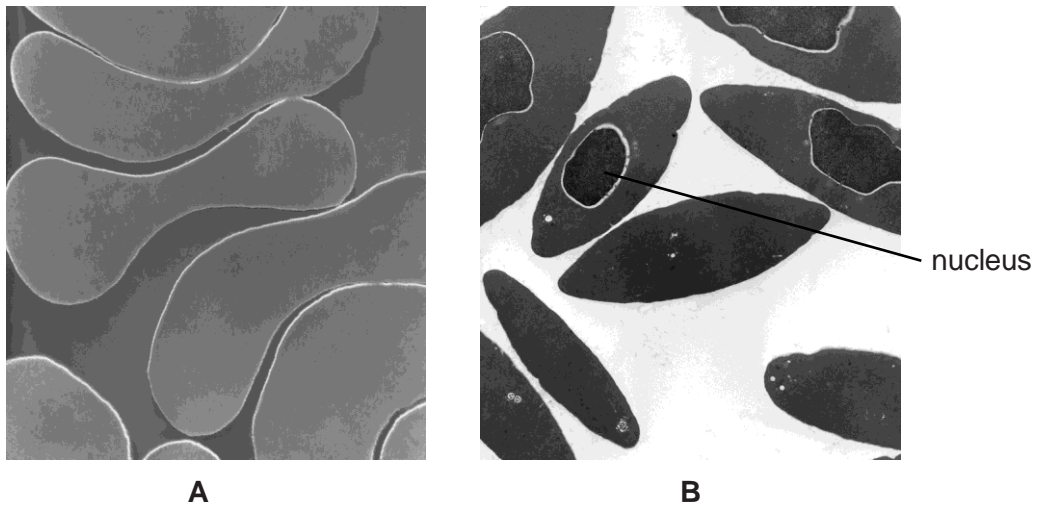


Fig. 3.1

(a) State the function of red blood cells.

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..... [1]

(b) There is a nucleus present in each of the red blood cells of the bird, as shown in Fig. 3.1.

(i) State the function of a nucleus.

.....
.....
..... [1]

(ii) Human red blood cells do not contain a nucleus.

State an advantage of this.

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.....
..... [1]

Red blood cells from humans were placed into three test-tubes. Each test-tube contained a salt solution of a different concentration. A sample was taken from each test-tube and viewed using a microscope. The results are shown in Fig. 3.2.

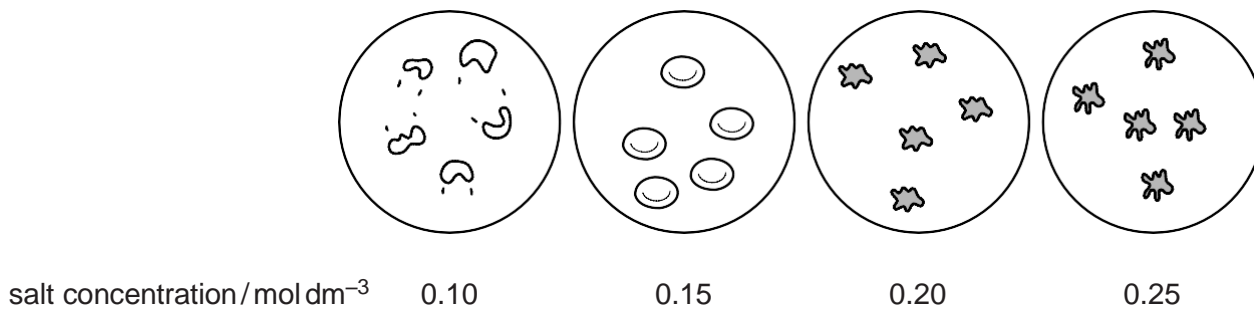


Fig. 3.2

(c) (i) Describe the appearance of the red blood cells in the 0.15 mol dm⁻³ salt solution and the red blood cells in the 0.20 mol dm⁻³ salt solution.

0.15 mol dm⁻³

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0.20 mol dm⁻³

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[2]

(ii) The red blood cells in the 0.10 mol dm⁻³ salt solution burst.

Explain why the red blood cells burst.

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[3]

(iii) Suggest why a plant cell in 0.10 mol dm⁻³ salt solution would not burst.

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[1]

(d) Some people in accidents lose a lot of blood. Doctors give patients fluid to replace lost blood.

(i) Use the information in Fig. 3.2 to predict and explain the concentration of fluid replacement given to patients who have lost blood.

prediction

explanation

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.....

[2]

(ii) Describe the process of blood clotting.

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..... [3]

[Total: 14]

3 Leaves are made of tissues.

(a) Define the term *tissue*.

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.....[1]

Fig. 4.1 is a photograph of a transverse section of a leaf, showing the upper and lower surfaces.

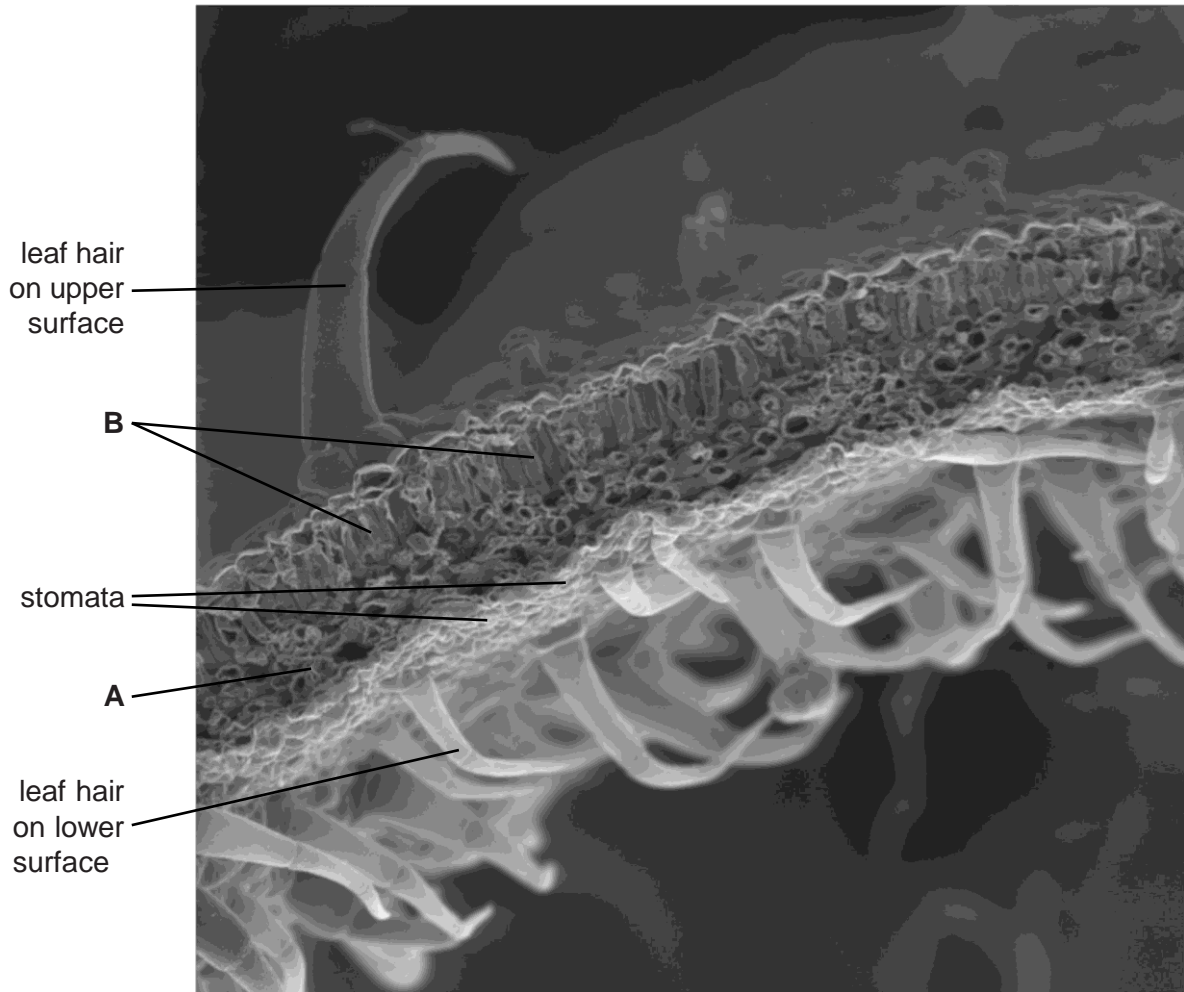


Fig. 4.1

(b) Name:

(i) tissue **A**

.....[1]

(ii) the process by which gases travel through the stomata.

.....[1]

(c) Describe how root hair cells differ from the cells labelled **B** in Fig. 4.1.

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.....[2]

(d) Outline how water that has entered a root hair cell reaches the stomata.

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.....[4]

(e) Leaf hairs, shown in Fig. 4.1, help to increase the humidity near the leaf surface.

(i) Compare the leaf hairs on the upper leaf surface with the leaf hairs on the lower leaf surface.

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.....[1]

(ii) Explain the importance of increasing humidity near the leaf surface.

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.....
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.....[2]

[Total: 12]

4 Fig. 1.1 shows a common emerald dove, *Chalcophaps indica*.



Fig. 1.1

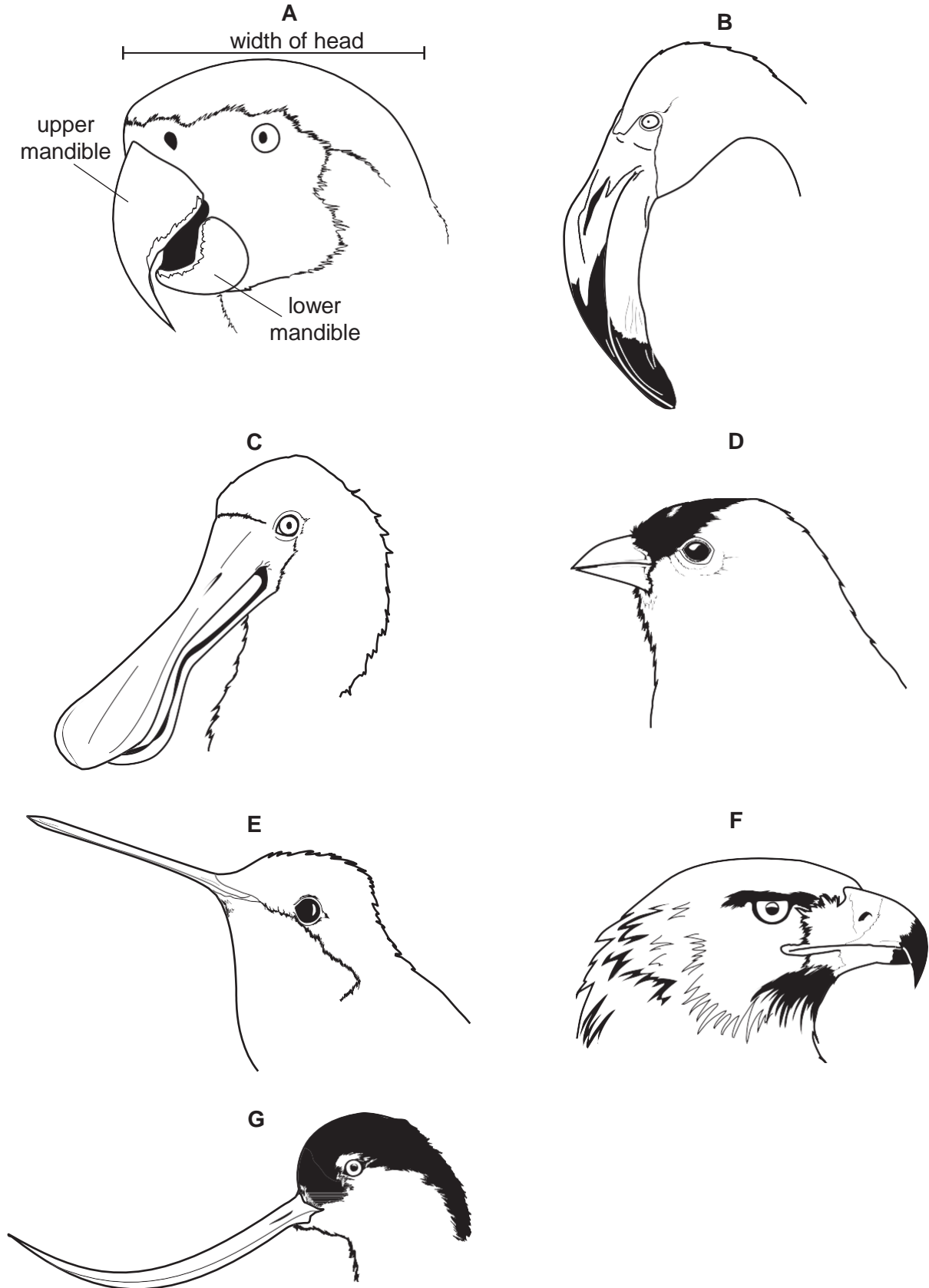
(a) Two distinguishing features of birds are beaks and wings.

State **one other** feature shown **only** by birds that is visible in Fig. 1.1.

.....[1]

(b) Birds show variation in the sizes and shapes of their beaks. A beak is composed of an upper mandible and a lower mandible.

Fig. 1.2 shows the heads of seven different species of bird.



Use the key to identify each species. Write the letter of each species (**A** to **G**) in the correct box beside the key. One has been done for you.

key

1	(a)	beak is shorter than the width of the head	go to 2	
	(b)	beak is longer than the width of the head	go to 4	
2	(a)	upper mandible is same length as the lower mandible	<i>Spinus tristis</i>	
	(b)	upper mandible is longer than the lower mandible	go to 3	
3	(a)	lower mandible is about half the length of the upper mandible	<i>Ara ararauna</i>	A
	(b)	lower mandible is more than half the length of the upper mandible	<i>Aquila chrysaetos</i>	
4	(a)	both mandibles widen at the end of the beak	<i>Platalea regia</i>	
	(b)	both mandibles are a similar width along their whole length	go to 5	
5	(a)	beak is straight	<i>Trochilus polytmus</i>	
	(b)	beak is curved	go to 6	
6	(a)	beak curves upwards	<i>Recurvirostra americana</i>	
	(b)	beak curves downwards	<i>Phoenicopterus minor</i>	

(c) Fig. 1.3 shows the events that occur during sexual reproduction in birds. The numbers in brackets indicate the number of chromosomes in the nuclei of the cells of the common emerald dove.

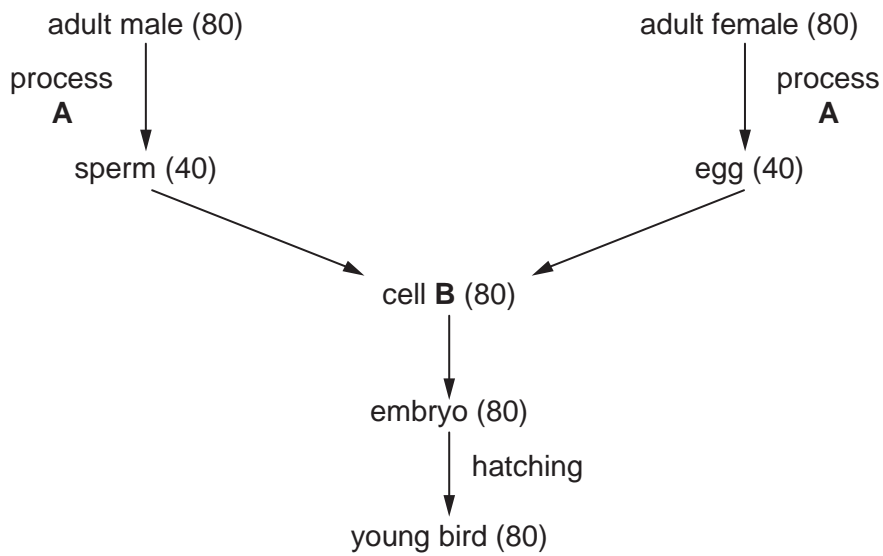


Fig. 1.3

(i) Name process **A** and cell **B**.

A

B

[2]

(ii) State why cell **B** is described as a diploid cell.

.....[1]

(iii) The embryo of the bird develops from cell **B**.

State what is meant by the term *development*.

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.....[1]

(iv) Sexual reproduction usually leads to variation.

Explain why variation is an advantage for a species such as the common emerald dove.

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.....[2]

[Total: 10]