Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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**BIOLOGY** **0610/33**

Paper 3 Extended **May/June 2015**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **20** printed pages.

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CAMBRIDGE International Examinations

**1** Fig. 1.1 shows seven different species of amphibian.

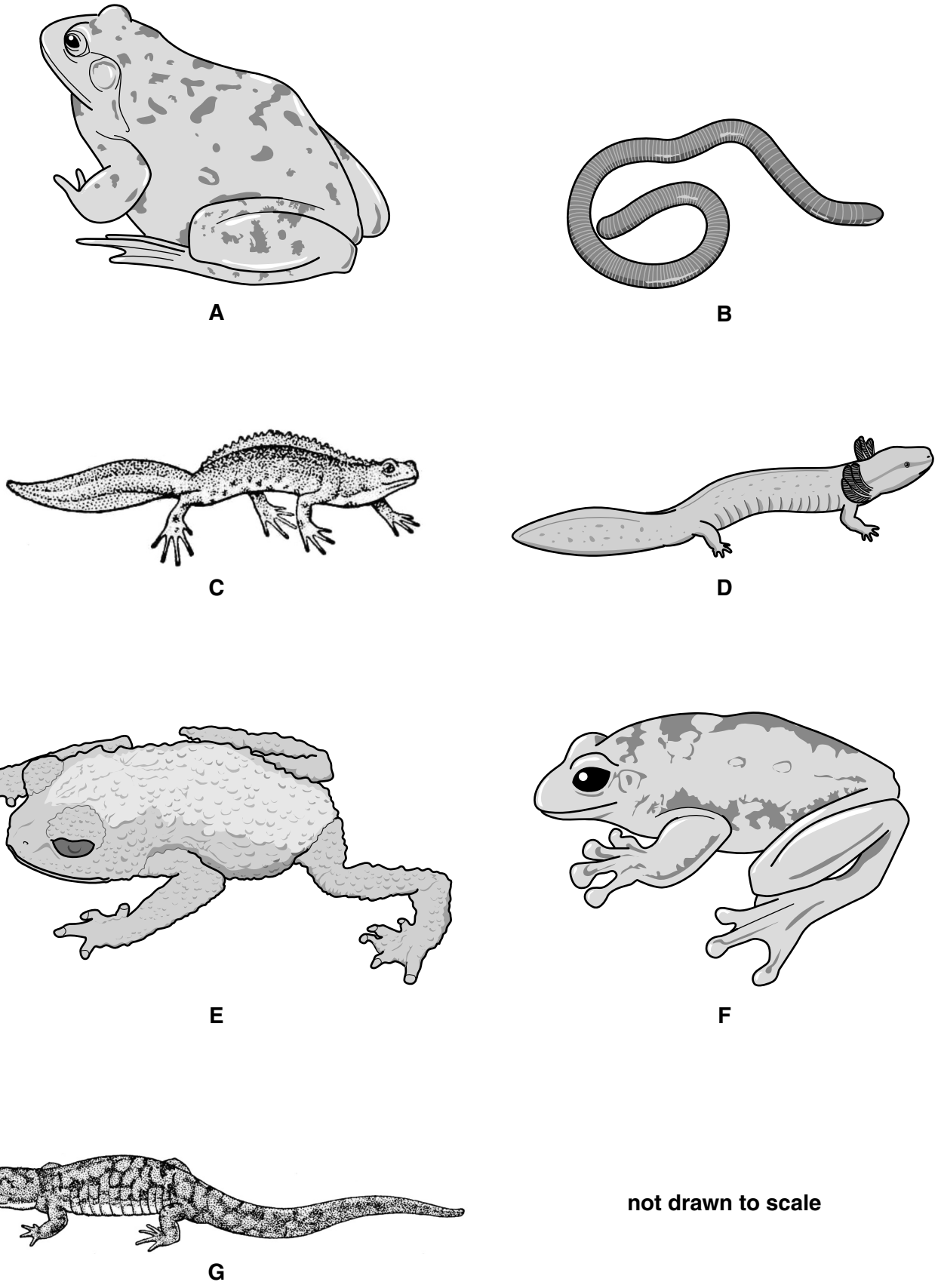


**Fig. 1.1**

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**(a)** 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.

View solution

**Key**

| | | | |
|---|---|---|---|
| 1 (a) | long, narrow body, with or without legs | go to 2 | |
| (b) | body not long and narrow, back legs are larger than the front legs | go to 5 | |
| 2 (a) | body without legs | *Gymnopis multiplicata* | **B** |
| (b) | body with legs which are all of the same size | go to 3 | |
| 3 (a) | raised crest along the back of the body | *Triturus cristatus* | |
| (b) | no crest along the back of the body | go to 4 | |
| 4 (a) | gills present | *Necturus maculosus* | |
| (b) | no gills present | *Ambystoma tigrinum* | |
| 5 (a) | skin is smooth | go to 6 | |
| (b) | skin is not smooth | *Oreophrynella quelchii* | |
| 6 (a) | digits end in swellings | *Polypedates leucomystax* | |
| (b) | digits do not end in round swellings | *Rana temporaria* | |

[3]

**(b)** Many amphibian species throughout the world are endangered.

View solution

Suggest **three** reasons why many amphibian species are endangered.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

**[Total: 6]**

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**2** Some plants can be grown in water using the technique of hydroponics. The roots are in water and supplied with the ions that they need at the concentrations that support maximum growth. Some ions can be absorbed both by diffusion and by active transport.

**(a) (i)** State **two** features of diffusion that do not apply to active transport.

View solution

1 .....

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2 .....

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[2]

**(ii)** Explain how roots are adapted to absorb ions.

View solution

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.....[2]

A group of students investigated the effect of soaking small onion bulbs in different concentrations of sodium chloride solution. They peeled off the outer papery leaves of the onion bulbs and divided the onions into 6 batches, each with 10 onions.

The onions were surface dried with paper towels and weighed. The mean mass of the onions in each batch was calculated. The onions were then left in sodium chloride solutions for three hours.

After three hours the students surface dried the onions and weighed them again. Their results are given in Table 2.1.

**Table 2.1**

| concentration of sodium chloride solution / g dm$^{-3}$ | mean mass of onions / g | | percentage change in mass |
|---|---|---|---|
| | before soaking | after soaking for 3 hours | |
| 0 | 147 | 173 | +17.7 |
| 25 | 153 | 165 | +7.8 |
| 50 | 176 | 172 | –2.3 |
| 100 | 154 | 149 | –3.2 |
| 150 | 149 | 142 | –4.7 |
| 200 | 183 | 175 | |

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**(b) (i)** Calculate the percentage change in mass of the onions that were in the most concentrated solution of sodium chloride. Show your working. Write your answer in Table 2.1.

View solution

[2]

**(ii)** Explain why the students calculated the percentage change in mass of the onions.

View solution

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.....[2]

**(c)** The students plotted a graph of the results as shown in Fig. 2.1.

View solution

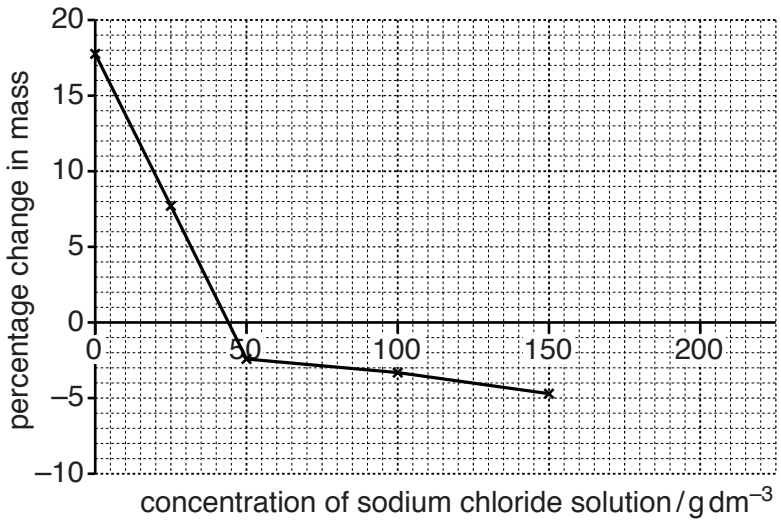


**Fig. 2.1**

**(i)** Complete the graph using your answer to **(b)(i)**. [1]

**(ii)** Use the graph in Fig. 2.1 to estimate the concentration of the sodium chloride solution that has the same water potential as the onions.

.....[2]

View solution

**(d)** Using the term **water potential**, explain why the onions:

View solution

gained mass when soaked in dilute solutions of sodium chloride

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lost mass when soaked in concentrated solutions of sodium chloride.

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[4]

**[Total: 15]**

**Question 3 begins on page 8.**

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**3** Researchers in Michigan investigated the rate of photosynthesis in leaves of big-tooth aspen trees, *Populus grandidentata*, by placing some of the growing leaves inside transparent boxes.

The researchers measured the uptake of carbon dioxide by the leaves over a range of temperatures from 10–40 °C. They carried out their measurements at two different concentrations of carbon dioxide:

**H** – 325 ppm carbon dioxide which is close to the concentration in the atmosphere;

**J** – 1935 ppm carbon dioxide which is a very high concentration.

The results are shown in Fig. 3.1.

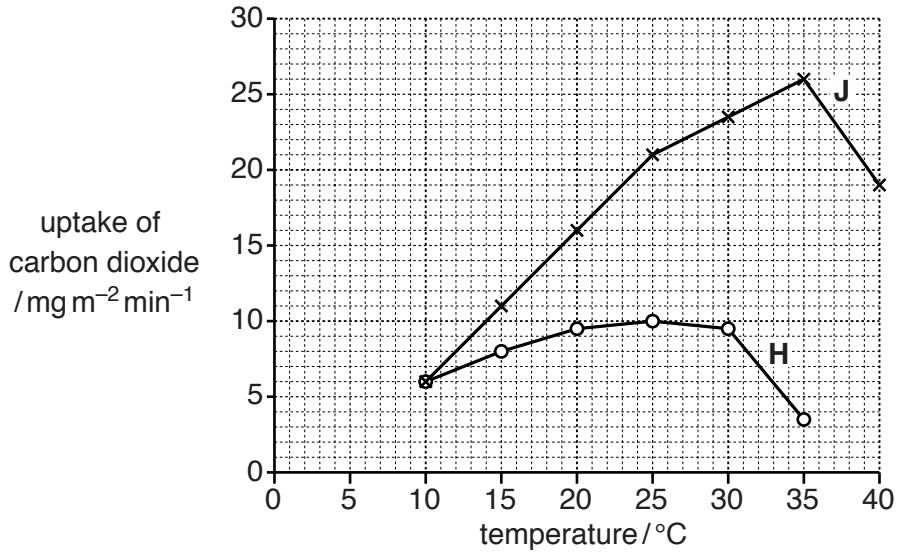


**Fig. 3.1**

**(a)** Describe how the results for the aspen leaves in batch **J** differ from the results for the aspen leaves in batch **H**. Use data from Fig. 3.1 in your answer.

.....

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.....[3]

View solution

**(b)** Explain why the rate of photosynthesis in the leaves in batch **J**:

View solution

**(i)** increases with an increase in temperature from 15 °C to 35 °C

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.....[2]

**(ii)** decreases at temperatures above 35 °C.

View solution

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.....[2]

**(c)** Use the results in Fig. 3.1 to suggest **and** explain the likely effect on plant growth of an increase in carbon dioxide concentration in the atmosphere as a result of the combustion of fossil fuels.

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.....[5]

View solution **[Total: 12]**

**4** The lungs and the kidneys are excretory organs of the human body.

**(a) (i)** Define the term *excretion*.

View solution

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.....[3]

**(ii)** State an excretory product that is passed out through the lungs.

View solution

.....[1]

**(iii)** Outline the role of the liver in excretion.

View solution

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.....[3]

**(b)** Fig. 4.1 is a vertical section of the kidney.

View solution

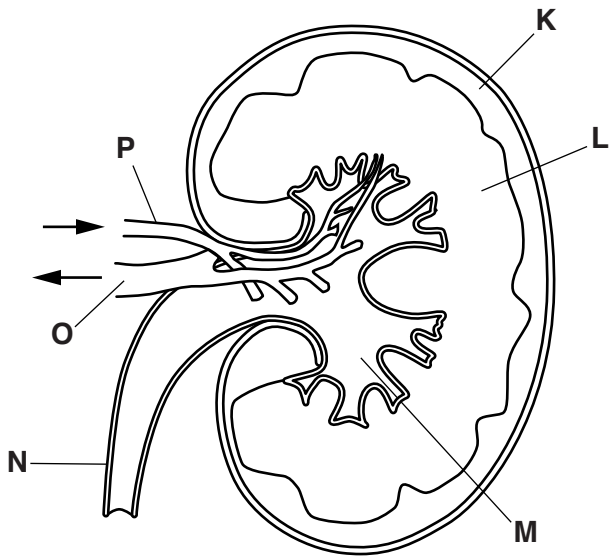


**Fig. 4.1**

Table 4.1 shows the functions of parts of the kidney.

Complete the table by:

- naming the part of the kidney that carries out each function
- using letters from Fig. 4.1 to identify the part of the kidney named.

One row has been completed for you.

**Table 4.1**

| function | name of part | letter from Fig. 4.1 |
|---|---|---|
| blood is filtered | | |
| concentration of urine is determined | medulla | **L** |
| urine flows to the bladder | | |
| blood is carried into the kidney | | |
| blood flows out of the kidney | | |

[4]

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**(c)** People with kidney disease are often treated in renal dialysis clinics. Their blood passes through tubes lined with a special membrane for about three hours.

View solution

**(i)** State **two** waste substances that are removed from the blood by dialysis.

1 .....

2 .....

[2]

**(ii)** Kidney patients may be given a kidney transplant. State **one** advantage and **one** disadvantage of kidney transplants compared with dialysis.

advantage .....

.....

.....

disadvantage .....

.....

.....

[2]

**[Total: 15]**

View solution

**Question 5 begins on page 14.**

**5** The menstrual cycle involves monthly changes in the ovary and the uterus.

**(a)** Fig. 5.1 shows the sequence of changes within the ovary that occur during the menstrual cycle.

View solution

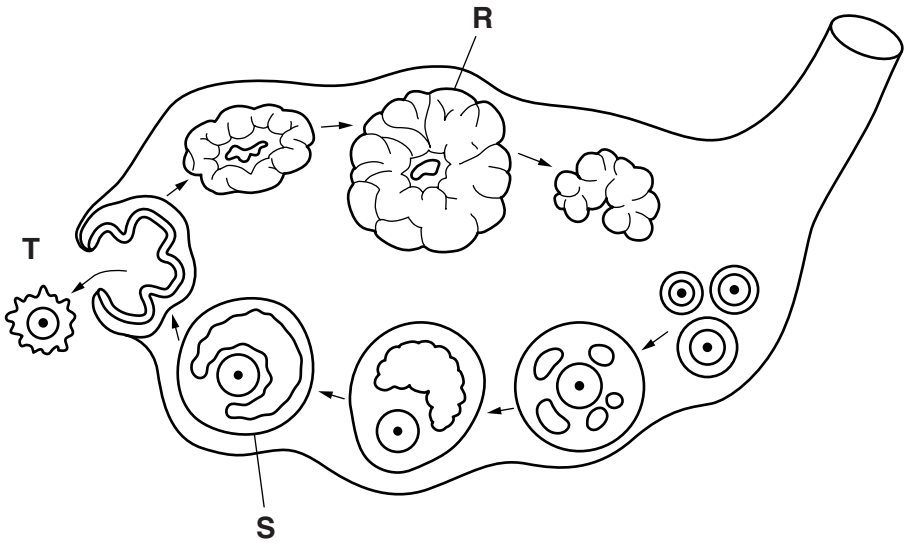


**Fig. 5.1**

**(i)** Name structures **R** and **S**.

**R** .....

**S** .....

[2]

**(ii)** State the name of the process that is occurring at **T**.

View solution

.....[1]

**(b)** The ovary secretes hormones that control the growth and maintenance of the lining of the uterus.

View solution

Name the hormone that stimulates:

**(i)** the growth of the lining of the uterus during the first half of the menstrual cycle

.....[1]

**(ii)** the maintenance of the lining of the uterus during the second half of the menstrual cycle.

.....[1]

View solution

**(c)** Fig. 5.2 is an electron micrograph showing a sperm cell on the surface of an egg cell.

View solution

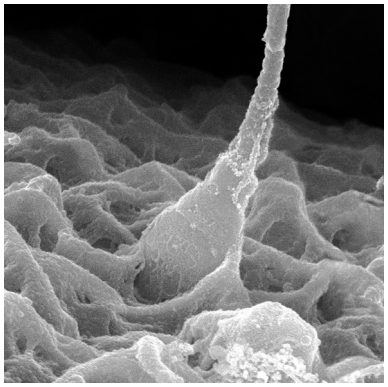

**Fig. 5.2**

**(i)** State **three** ways in which a sperm cell differs from an egg cell.

1 .....

2 .....

3 .....[3]

**(ii)** Human body cells have 46 chromosomes. Human egg and sperm cells have 23 chromosomes each.

What term is used to describe the number of chromosomes in a gamete, such as an egg cell or a sperm cell?

.....[1]

**(iii)** State the organ in which fertilisation occurs in humans.

.....[1]

**(iv)** Describe what happens between the event shown in Fig. 5.2 and implantation in the uterus.

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.....[4]

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**(d)** Clomiphene citrate is a fertility drug that has been available for over 50 years. As part of a fertility treatment clomiphene citrate is taken once a day (daily dose) for about five days.

Researchers investigated the use of the drug in Denmark between 1974 and 1993. The results of their study are shown in Fig. 5.3.

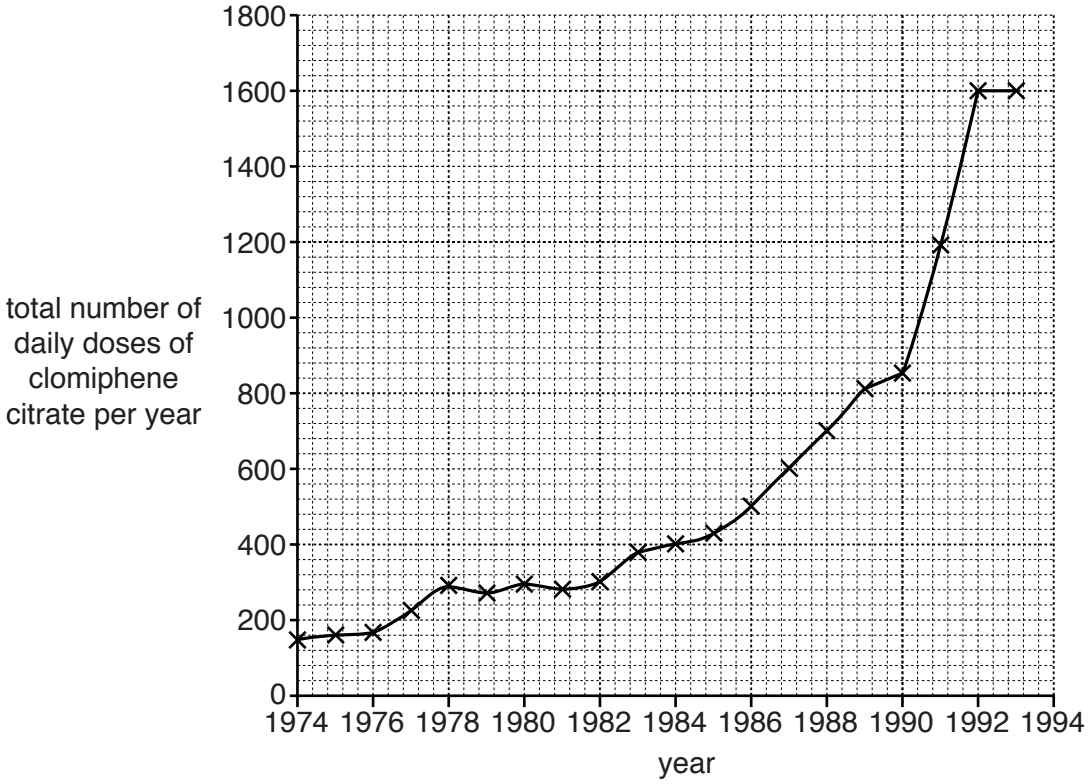


**Fig. 5.3**

**(i)** Describe the change in the use of clomiphene citrate in Denmark between 1974 and 1993. Use data from Fig. 5.3 in your answer.

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.....[2]

**(ii)** Clomiphene citrate is used as part of a treatment cycle to help women become pregnant. Often this involves artificial insemination (AI).

View solution

Describe how a treatment cycle involving fertility drugs **and** AI would be carried out.

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.....[3]

**[Total: 19]**

**6** Some integrated farming systems involve making best use of all available resources without the use of large inputs of energy in the form of fossil fuels.

A study looked at what happened to the light energy that was the major energy input to farms in the Zhujiang delta in China. The farms are based on a dyke-pond system as shown in Fig. 6.1.

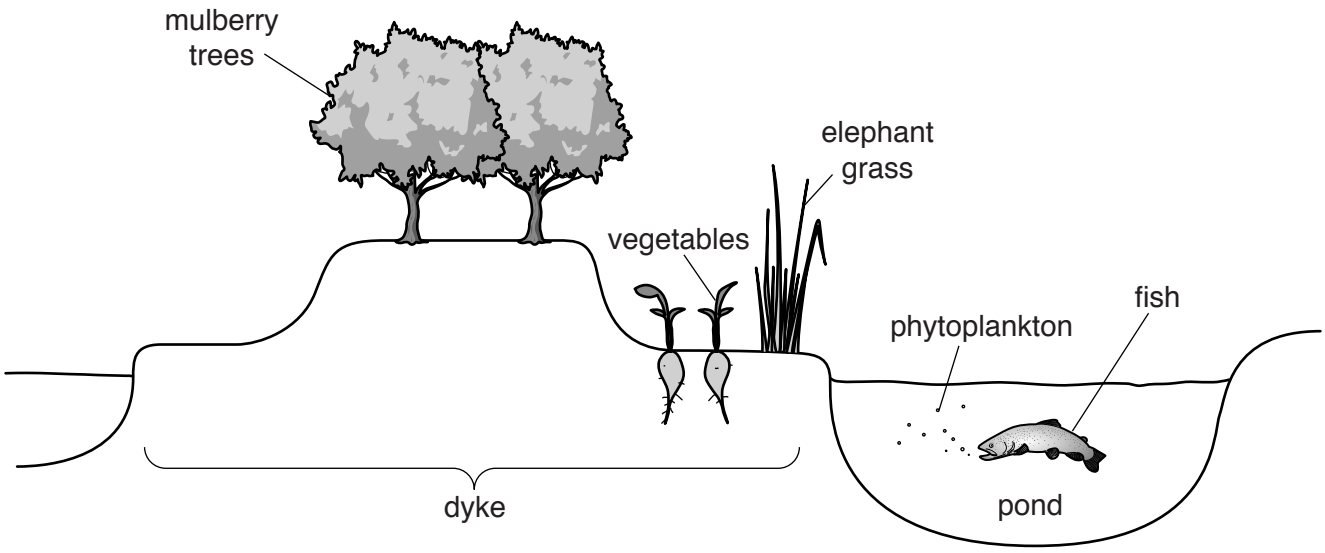


**Fig. 6.1**

Elephant grass, vegetables and mulberry trees are grown on the dykes in between the ponds. The elephant grass is grown and then cut to feed the fish. Vegetables and fish are used for human consumption. Silkworms feed on the mulberry trees. Phytoplankton are the main producers in the pond and are eaten by the fish.

**(a) (i)** Explain the meaning of the term *producer*.

View solution

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.....[2]

**(ii)** Use the information provided in the passage on page 18 and in Fig. 6.1 to **complete** a food web for the farm. Some of the producers have been drawn for you.

View solution

| | | |
|---|---|---|
| mulberry trees | vegetables | phytoplankton in the pond |

[5]

**(b)** In the study the researchers discovered that the vegetables absorbed 1560 MJ $m^{-2}$ per year of light energy. The energy which was transferred from the vegetables to humans was 3 MJ $m^{-2}$ per year.

Explain what happens to the energy that is absorbed by the vegetables but is not transferred to humans.

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.....[3]

View solution

**(c)** Suggest the advantages to a farmer of including ponds stocked with fish in an integrated farming system.

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.....[3]

**[Total: 13]**

View solution

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