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

**BIOLOGY** **0610/21**

Paper 2 Multiple Choice (Extended) **May/June 2016**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 0 1 3 7 1 7 3 8 0 8 *

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

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

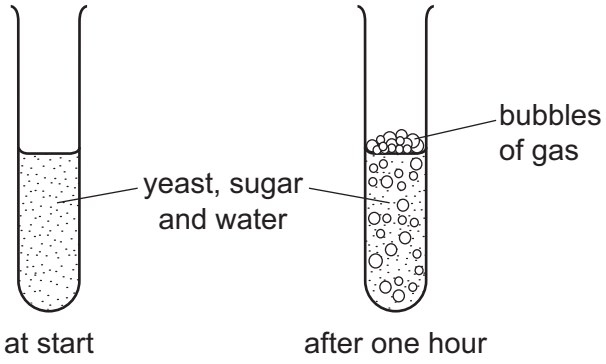
This document consists of **16** printed pages.


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**1** Some yeast, sugar and water are mixed in a test-tube. The diagrams show the test-tube at the start and after one hour.




Which process causes this change?

**A** growth

**B** reproduction

**C** respiration

**D** sensitivity

**2** Which name is given to a group of individuals that can reproduce to produce fertile offspring?

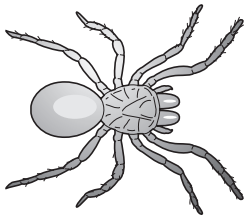
**A** a genus

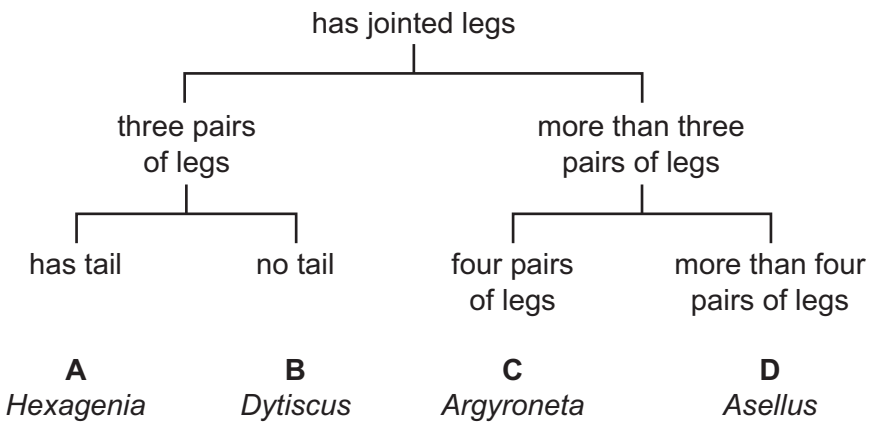
**B** a kingdom

**C** a species

**D** an organ system

**3** Use the key to identify the animal shown in the diagram.






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**4** Which organelles are present in large numbers in cells that produce insulin?

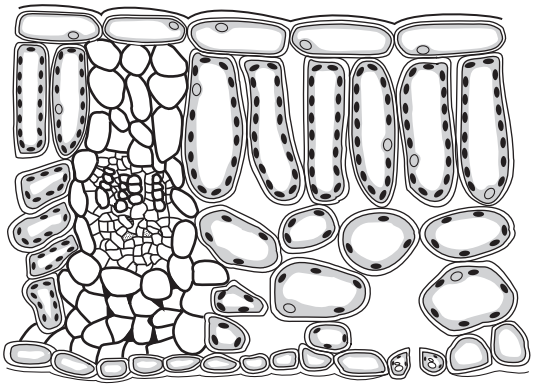
**A** nuclei and mitochondria

**B** ribosomes and mitochondria

**C** rough endoplasmic reticulum and cell walls

**D** vesicles and nuclei

**5** The actual thickness of the leaf shown in the diagram is 2000 μm, but its thickness in the diagram is 50 mm.

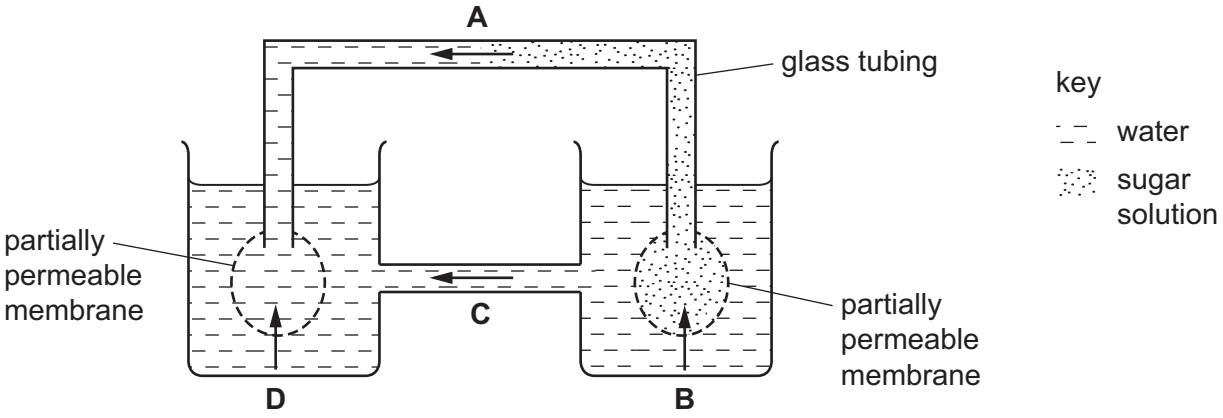


What is the magnification of the diagram?

**A** ×0.025 **B** ×25 **C** ×100 **D** ×100 000

**6** The diagram shows an experiment on osmosis.

Which arrow shows the direction of the net movement of water at the start of the experiment?



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**7** Active transport is the movement of

**A** molecules from a region of their higher concentration to a region of their lower concentration.

**B** particles from a region of lower concentration to a region of higher concentration using energy from respiration.

**C** urine by relaxation of a sphincter muscle in the bladder.

**D** water through a partially permeable membrane from a more dilute to a more concentrated solution.

**8** When bases pair up in the formation of DNA, what is one of the pairings?

**A** G with A **B** G with C **C** G with G **D** G with T

**9** Small molecules are used as the basic units in the synthesis of large food molecules.

Which statement is correct?

**A** Amino acids are basic units of carbohydrates.

**B** Fatty acids are basic units of glycogen.

**C** Glycerol is a basic unit of oils.

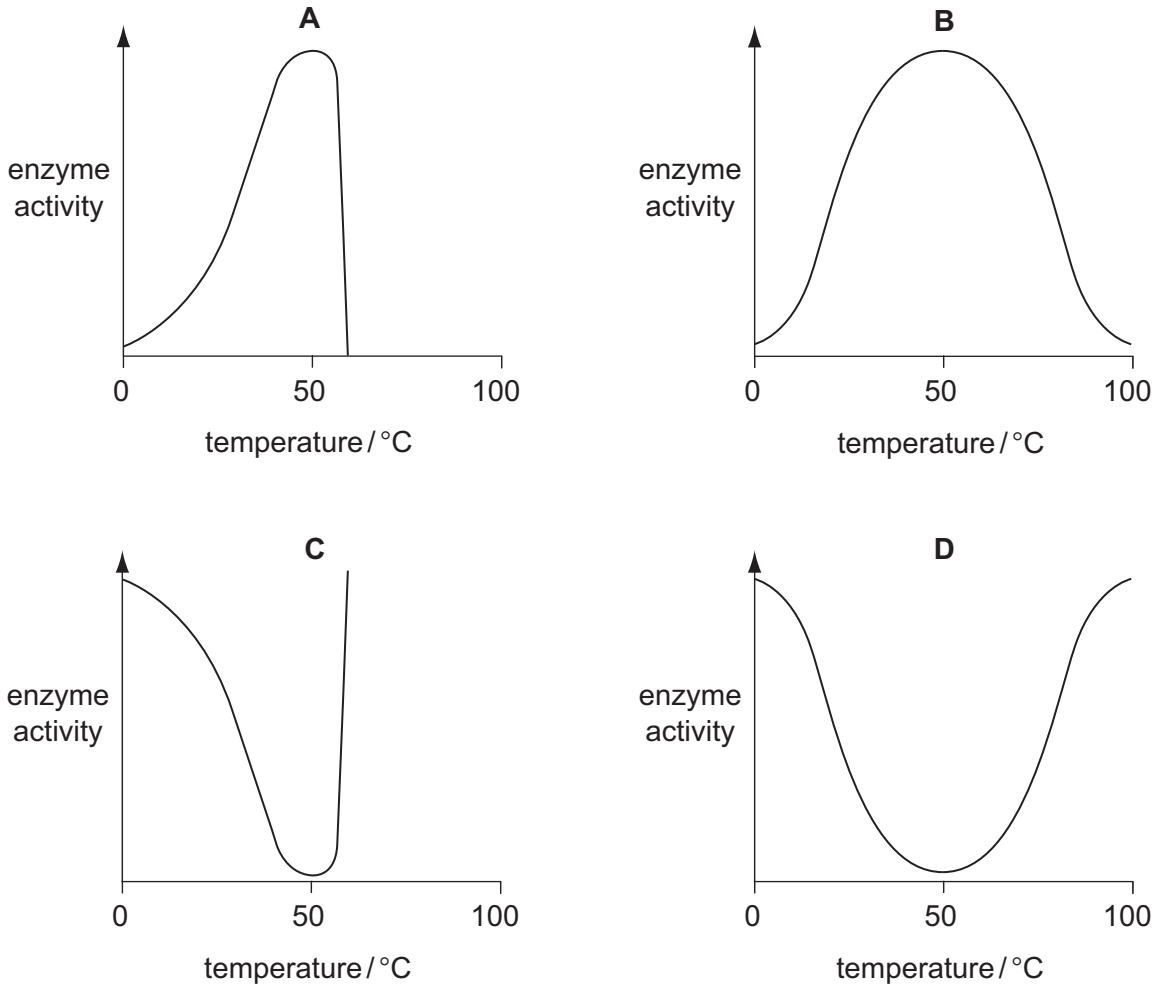
**D** Simple sugar is a basic unit of protein.

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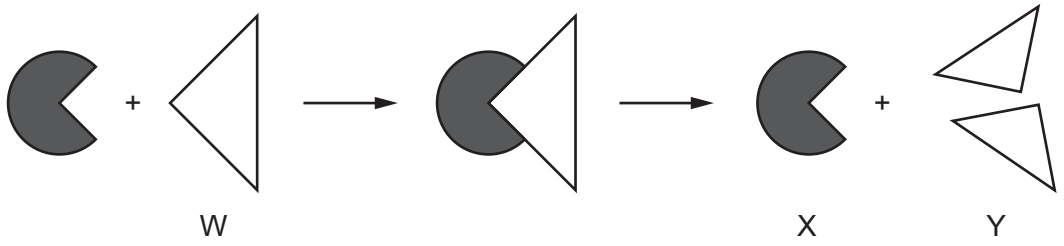
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**10** Which graph shows the effect of temperature on the activity of an enzyme?




**11** The diagram represents enzyme action.




What are parts W, X and Y in this chemical reaction?

| | enzyme | product | substrate |
|---|---|---|---|
| **A** | W | X | Y |
| **B** | X | W | Y |
| **C** | X | Y | W |
| **D** | Y | W | X |

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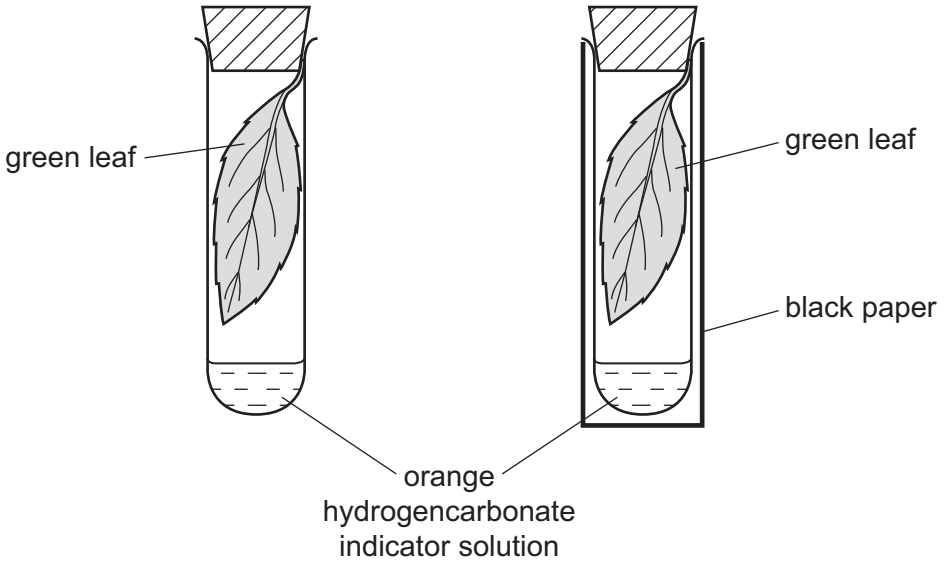


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**12** Two similar leaves are set up in test-tubes as shown. One is exposed to light, while the other is kept in the dark.




After a few hours, which colour would the hydrogencarbonate indicator solution be in each tube?

| | light | dark |
|---|---|---|
| **A** | colourless | blue-black |
| **B** | purple | yellow |
| **C** | red | blue |
| **D** | yellow | purple |

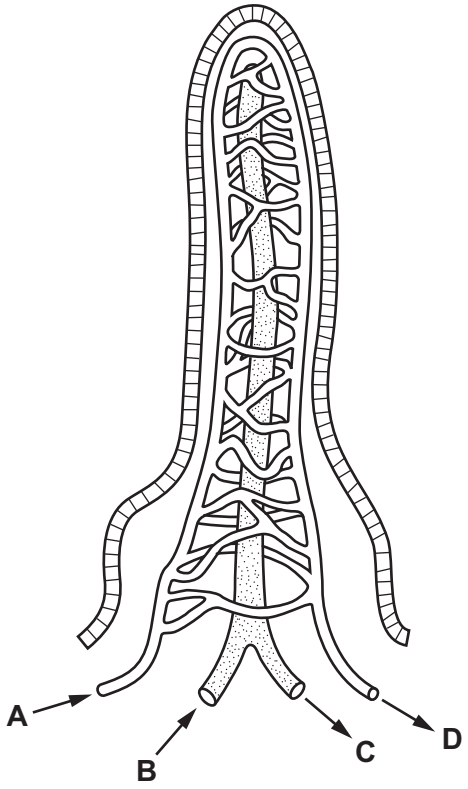
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**13** The diagram shows a villus. The arrows show the direction of flow within vessels associated with the villus.

Which vessel carries blood to the liver?




**14** What is **not** a result of cholera infection?

**A** intestinal blockage

**B** loss of salts from blood

**C** severe dehydration of body tissues

**D** severe diarrhoea

**15** What is the function of bile?

**A** to acidify food entering the duodenum

**B** to emulsify starch

**C** to increase the surface area of fats for digestion

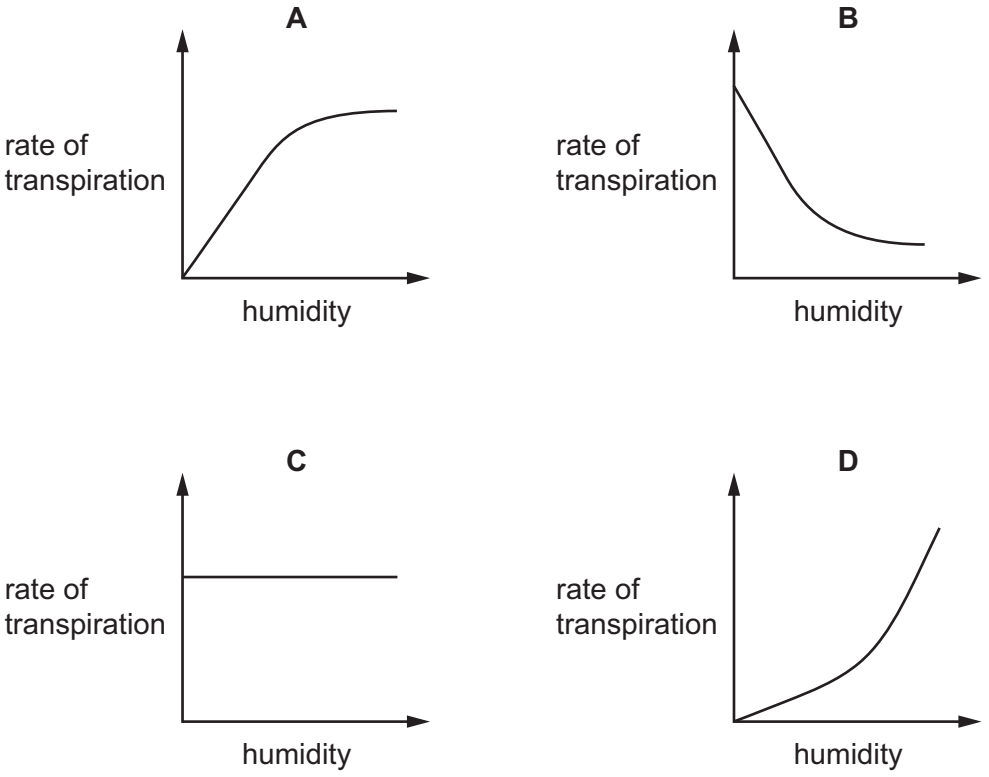
**D** to provide enzymes for fat digestion

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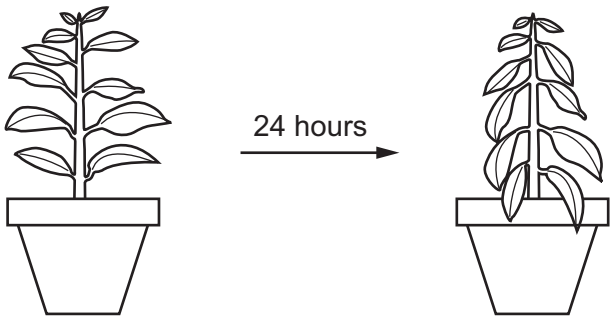


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**16** Which graph shows most clearly what will happen to the rate of transpiration as humidity increases?




**17** The diagram shows a potted plant and the same plant 24 hours later.




What causes the change in the appearance of the plant?

**A** Water loss is greater than water uptake.

**B** Water moves from the leaves to the stem.

**C** Water uptake is equal to water loss.

**D** Water uptake is greater than water loss.

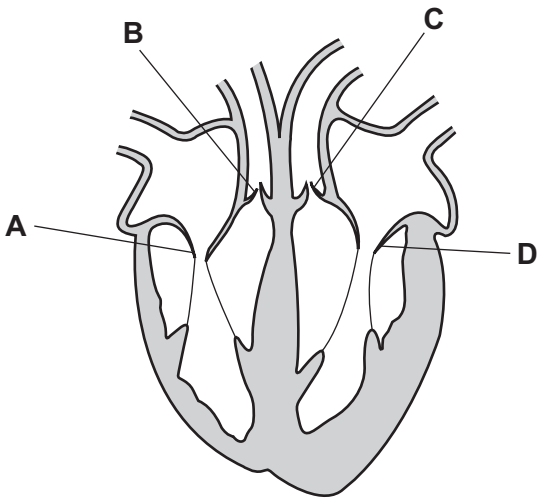
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**18** The diagram shows a section through the human heart.

Which is the right atrioventricular valve?




**19** What is the function of lymphocytes in the blood?

**A** antibody production

**B** blood clotting

**C** phagocytosis

**D** transport of hormones

**20** Which part of a pathogen is recognised by the immune system?

**A** active site

**B** antibiotic

**C** antibody

**D** antigen

**21** Compared with atmospheric air, air breathed out by a human contains

**A** less water vapour, less carbon dioxide.

**B** less water vapour, more carbon dioxide.

**C** more water vapour, less carbon dioxide.

**D** more water vapour, more carbon dioxide.

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**22** What describes the actions of the intercostal muscles and the diaphragm when we breathe out?

| | external intercostal muscles | internal intercostal muscles | diaphragm |
|---|---|---|---|
| **A** | contract | relax | falls |
| **B** | contract | relax | rises |
| **C** | relax | contract | falls |
| **D** | relax | contract | rises |

**23** What is the word equation for aerobic respiration in plants?

**A** carbon dioxide + water → glucose + oxygen

**B** glucose + carbon dioxide → water + oxygen

**C** glucose + oxygen → carbon dioxide + water

**D** glucose + water → carbon dioxide + oxygen

**24** An amino acid is deaminated. This is the removal of

**A** the carbon-containing part.

**B** the nitrogen-containing part.

**C** the oxygen-containing part.

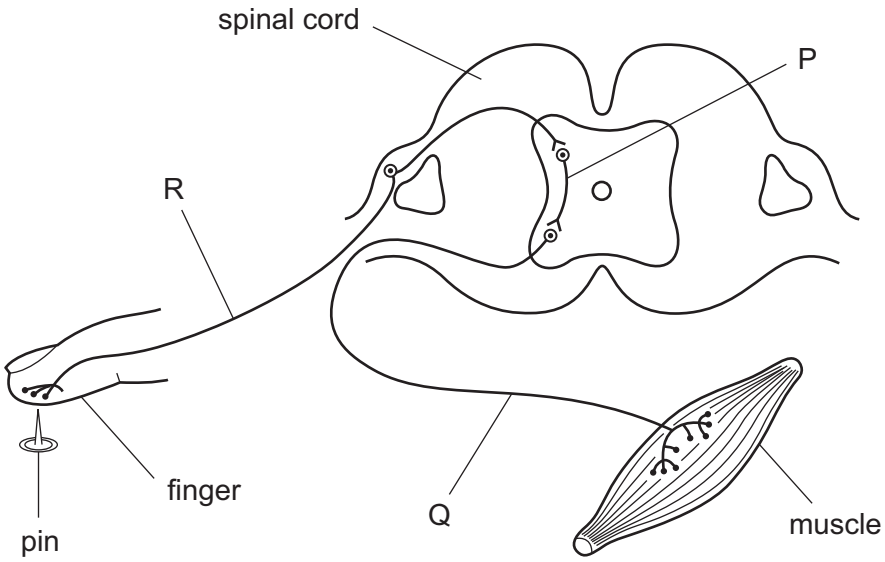
**D** the sulfur-containing part.

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**25** The diagram represents a simple reflex arc.

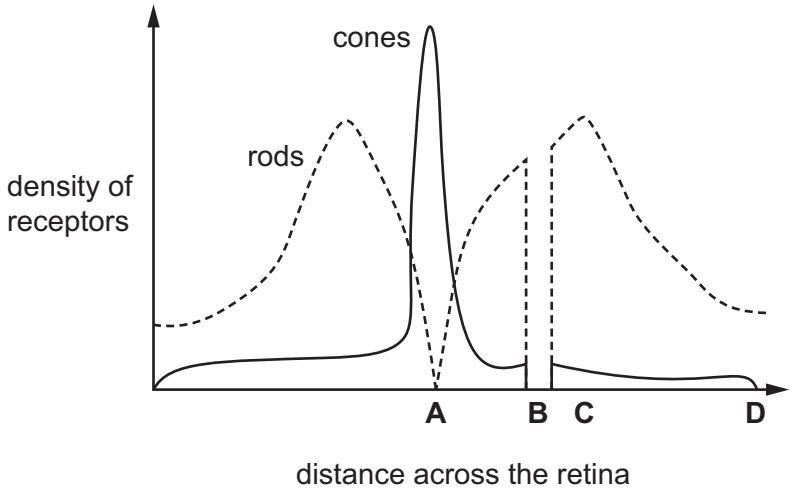



What is the sequence of nerve cells through which an impulse passes during a reflex action?

| | first → | | last |
|---|---|---|---|
| **A** | P | Q | R |
| **B** | Q | R | P |
| **C** | Q | P | R |
| **D** | R | P | Q |

**26** The diagram shows the density of rods and cones across a horizontal section of the retina.

What is the position of the optic nerve?



**27** What are the effects of insulin and glucagon on the concentration of blood glucose?

| | effect of insulin on blood glucose concentration | effect of glucagon on blood glucose concentration |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | increases | decreases |
| **D** | increases | increases |

**28** Which organ is most often damaged by regularly drinking too much alcohol?

**A** heart

**B** liver

**C** pancreas

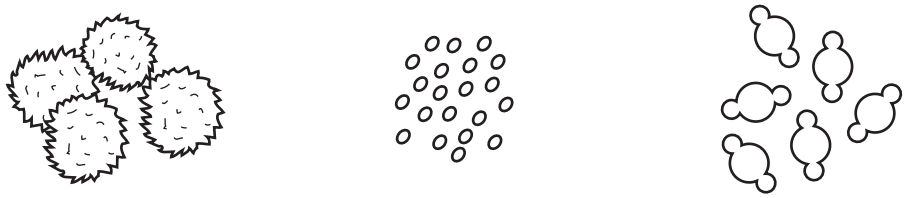
**D** stomach

**29** What are advantages of sexual and asexual reproduction?

| | advantage of sexual reproduction | advantage of asexual reproduction |
|---|---|---|
| **A** | less population growth | only one parent required |
| **B** | more energy efficient | gametes can be transferred by environment |
| **C** | more genetic variation | faster |
| **D** | no transfer of gametes needed | does not compete with the parent for nutrients |

**30** The diagrams show pollen grains from three different species of plant as they appear under the microscope. The diagrams are all to the same scale.

1 2 3



Which pollen grains are involved in insect-pollination?

**A** 1 and 2 **B** 1 only **C** 2 and 3 **D** 3 only

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**31** What happens to the chromosome number after meiosis and after mitosis?

| | meiosis | mitosis |
|---|---|---|
| **A** | halved | halved |
| **B** | halved | stays the same |
| **C** | stays the same | halved |
| **D** | stays the same | stays the same |

**32** In the inheritance of ABO blood groups, when two parents have the genotypes $I^AI^A$ and $I^AI^o$, what is the blood group of their offspring?

**A** group A

**B** group AB

**C** group B

**D** group O

**33** Which structures are present in a bacterial cell?

| | cell wall | nucleus |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**34** The whole of an island's population of short-haired bumblebees is descended from just two parents. These were introduced from the mainland.

Which statement about the island's short-haired bumblebee population, compared with that of the mainland, is correct?

**A** The population is less in danger of collapsing from disease.

**B** The population is more able to adapt to environmental changes.

**C** The population shows more genetic variety.

**D** The population will adapt to environmental changes more slowly.

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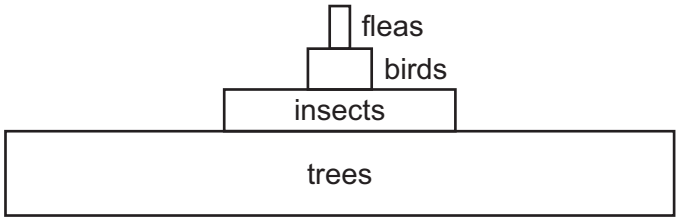


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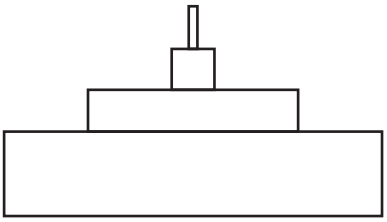


**35** The diagram shows a pyramid of biomass for a food chain in a woodland ecosystem.

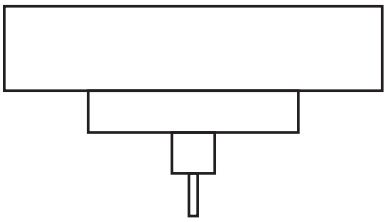



What is the pyramid of numbers for this food chain?

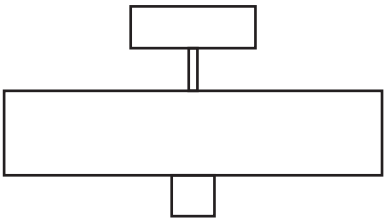
**A**



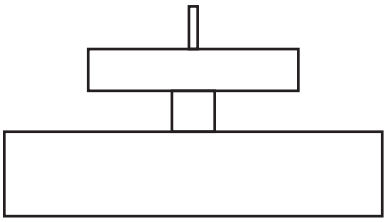
**B**



**C**

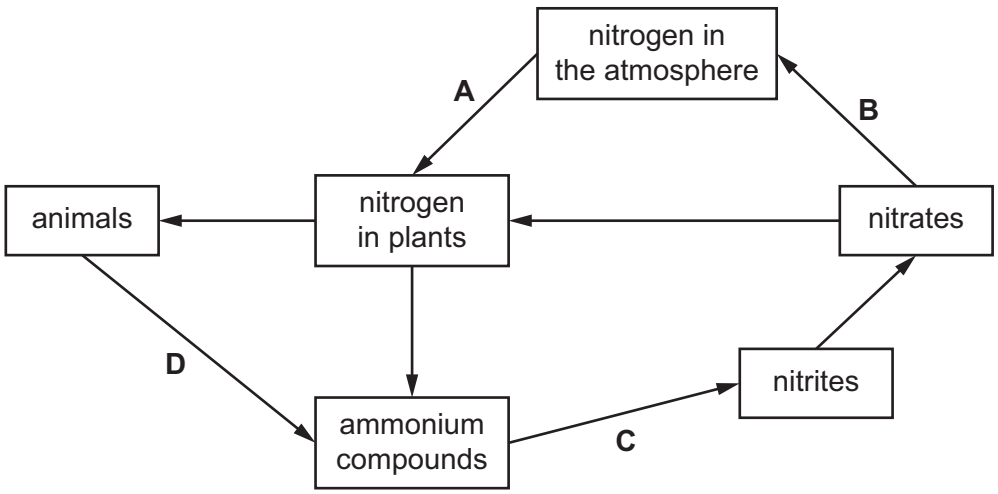


**D**



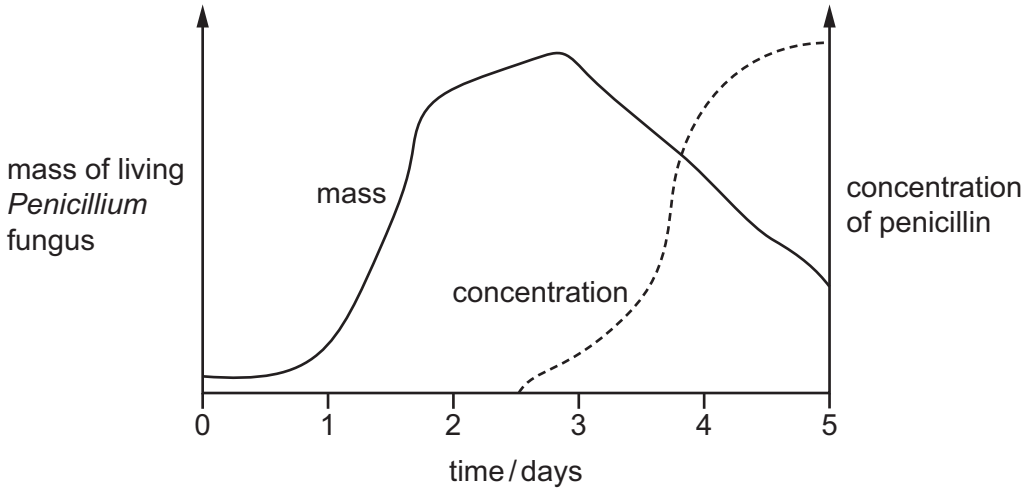
**36** The diagram shows part of the nitrogen cycle.

At which stage is denitrification occurring?




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**37** Penicillin is produced in a fermenter by growing the fungus *Penicillium*. The graph shows how the mass of living *Penicillium* fungus and the concentration of penicillin changed over time.




When is the best time to collect the penicillin?

**A** at 1.5 days

**B** at 3 days

**C** at 3.5 days

**D** at 5 days

**38** A gene for insulin is taken from a human cell and placed in a bacterium.

The bacterium can then make human insulin.

What is this process called?

**A** artificial selection

**B** genetic engineering

**C** heterozygous inheritance

**D** natural selection

**39** Which effect is **least** likely to occur as a result of deforestation?

**A** an increase in biodiversity

**B** an increase in soil erosion

**C** an increase in the level of carbon dioxide in the atmosphere

**D** an increased risk of flooding

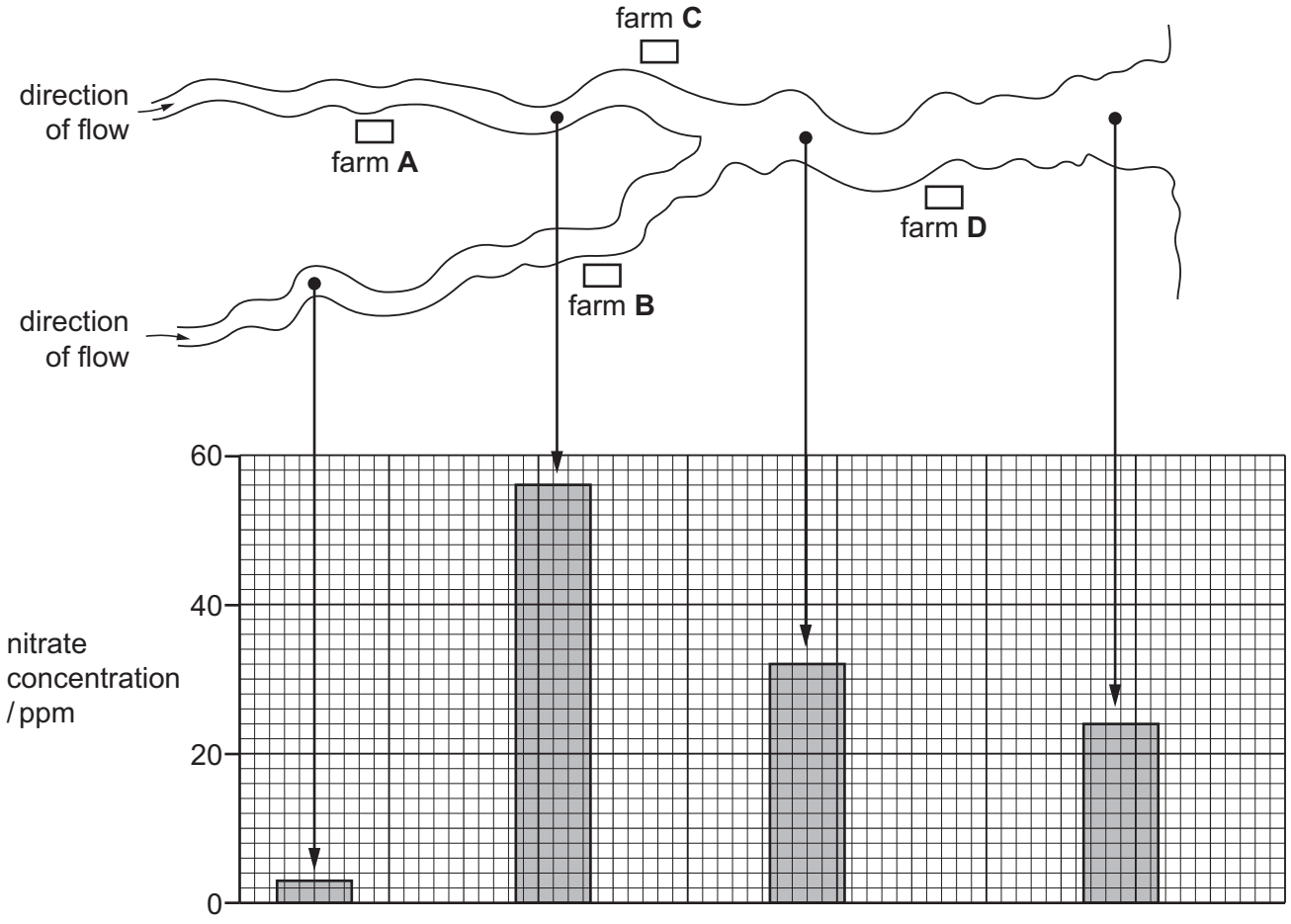
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**40** The diagram shows the positions of four farms and the concentrations of nitrate at different points in a river.

Which farm is likely to have been using too much fertiliser on its land?




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