Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

9076754804

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2016**

1 hour 45 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.

Section A
Answer **all** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **both** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section C
Answer **either** question 8 **or** question 9.
Write your answers in the spaces provided on the Question Paper.

You are advised to spend no longer than one hour on Section A.

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.

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Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows a plant with a magnified transverse section (TS) of the root and an incomplete, magnified transverse section (TS) of the stem.

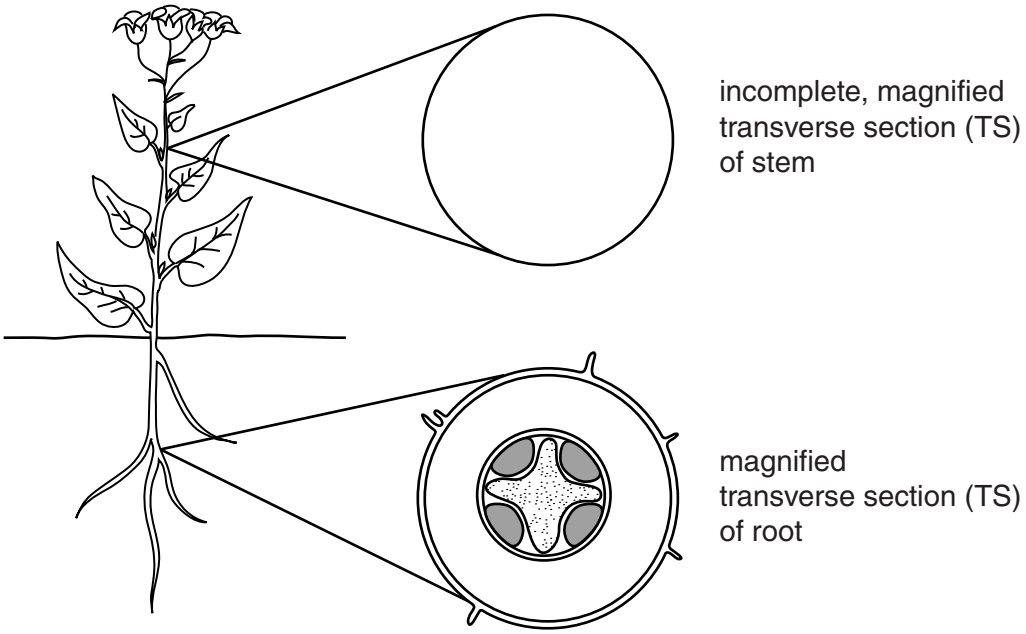


Fig. 1.1

(a) The transverse section of the root in Fig. 1.1 shows the distribution of xylem and phloem tissue.

(i) Using a labelling line and the letter **X**, show, on Fig. 1.1, the location of the xylem tissue in the transverse section (TS) of the root. [1]

(ii) Complete the transverse section (TS) of the stem in Fig. 1.1 to show the distribution of xylem and phloem tissue. [2]

(iii) Using a label line and the letter **P**, show the location of the phloem tissue that you have drawn. [1]

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(b) State the functions of phloem tissue.

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.....

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..... [3]

[Total: 7]

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[Turn over

2 Dry mass is the mass of all chemicals, excluding water, present in an organism.

Fig. 2.1 shows the stages of germination of a seed. Fig. 2.1 also shows the changes in dry mass of the plant during these stages of germination.

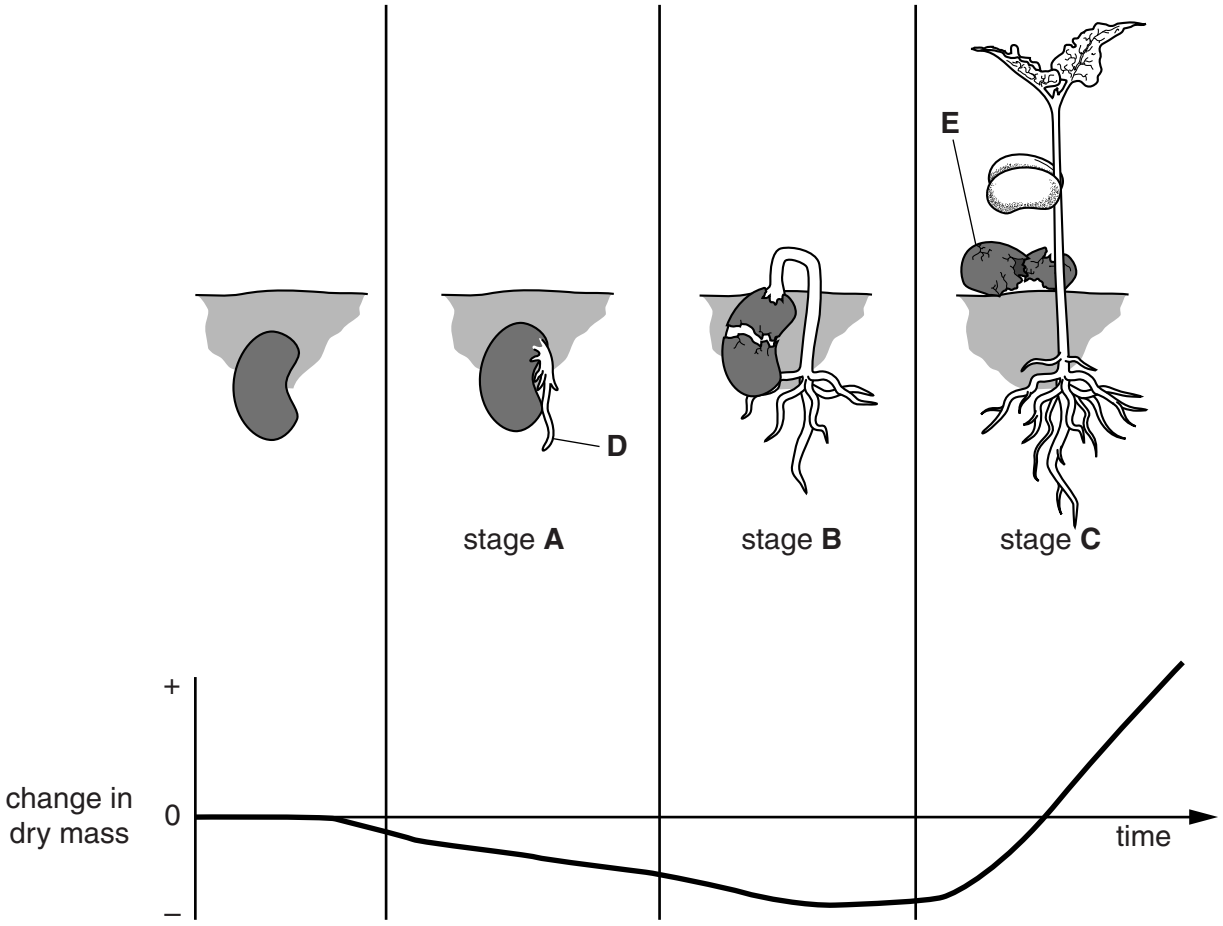


Fig. 2.1

(a) Name the parts labelled **D** and **E** in Fig. 2.1.

D ……..

E …….. [2]

(b) Describe and explain the changes in dry mass shown during each of the stages **A**, **B** and **C** in Fig. 2.1.

stage **A** .....

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.....

stage **B** .....

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stage **C** .....

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..... [6]

(c) Water is needed for germination of seeds.

State **two** other conditions needed for germination. Explain why each condition is needed.

condition .....

explanation .....

.....

.....

condition .....

explanation .....

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..... [4]

[Total: 12]

3 Digestion in the human alimentary canal is carried out by the action of enzymes. Each food group is the substrate for a specific enzyme.

(a) Fig. 3.1 shows diagrams that each represent the action of a specific enzyme to break down a substrate into one or more end products.

Diagram **F** in Fig. 3.1 has been completed for you.

Complete diagrams **G** and **H** in Fig. 3.1.

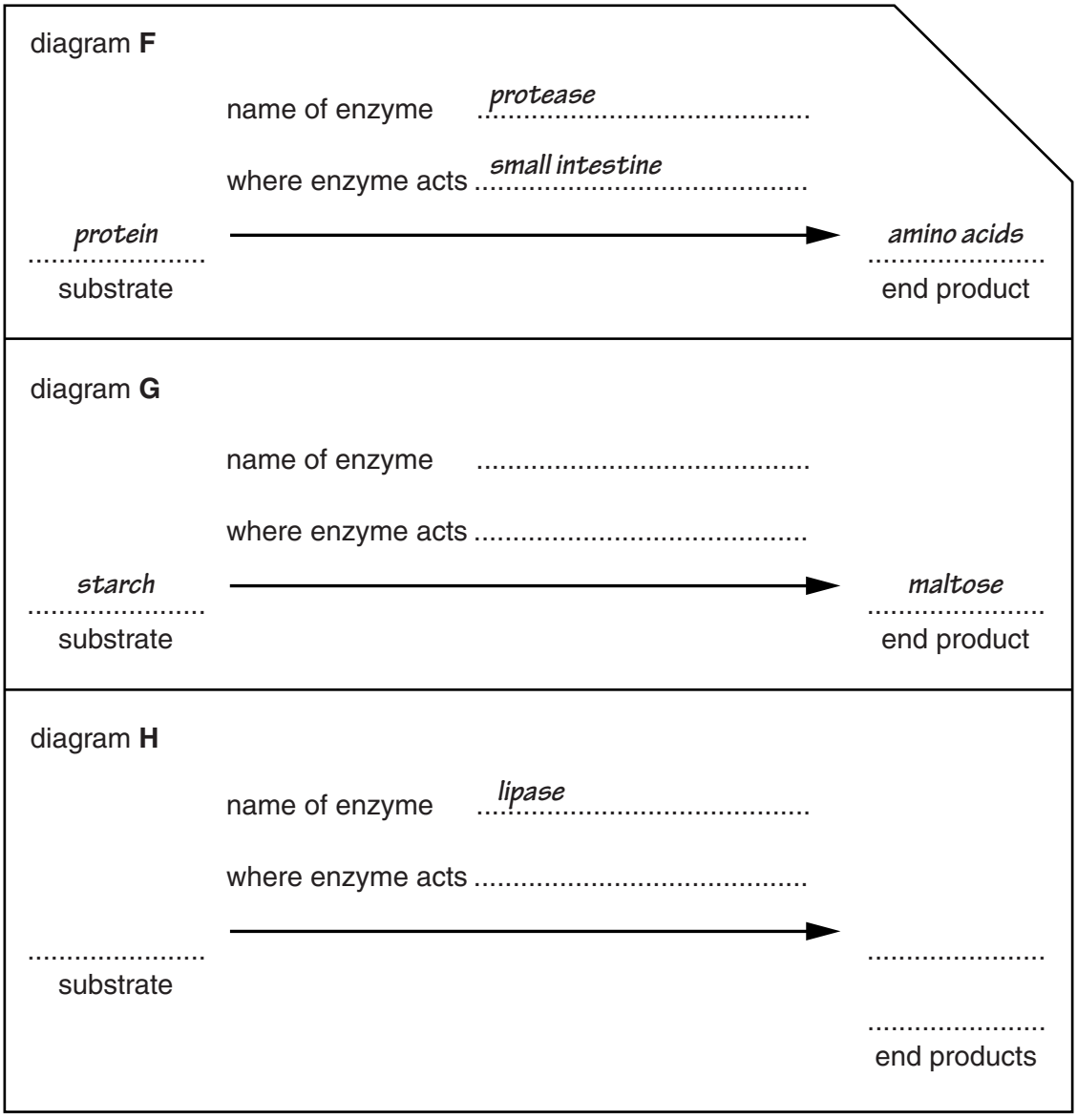


Fig. 3.1

[6]

(b) Amino acids are the end products of protein digestion. Describe what happens to these amino acids from the point of digestion until they reach the liver.

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..... [4]

[Total: 10]

4 Fig. 4.1 shows the stages in the process of genetic engineering to produce the hormone insulin.

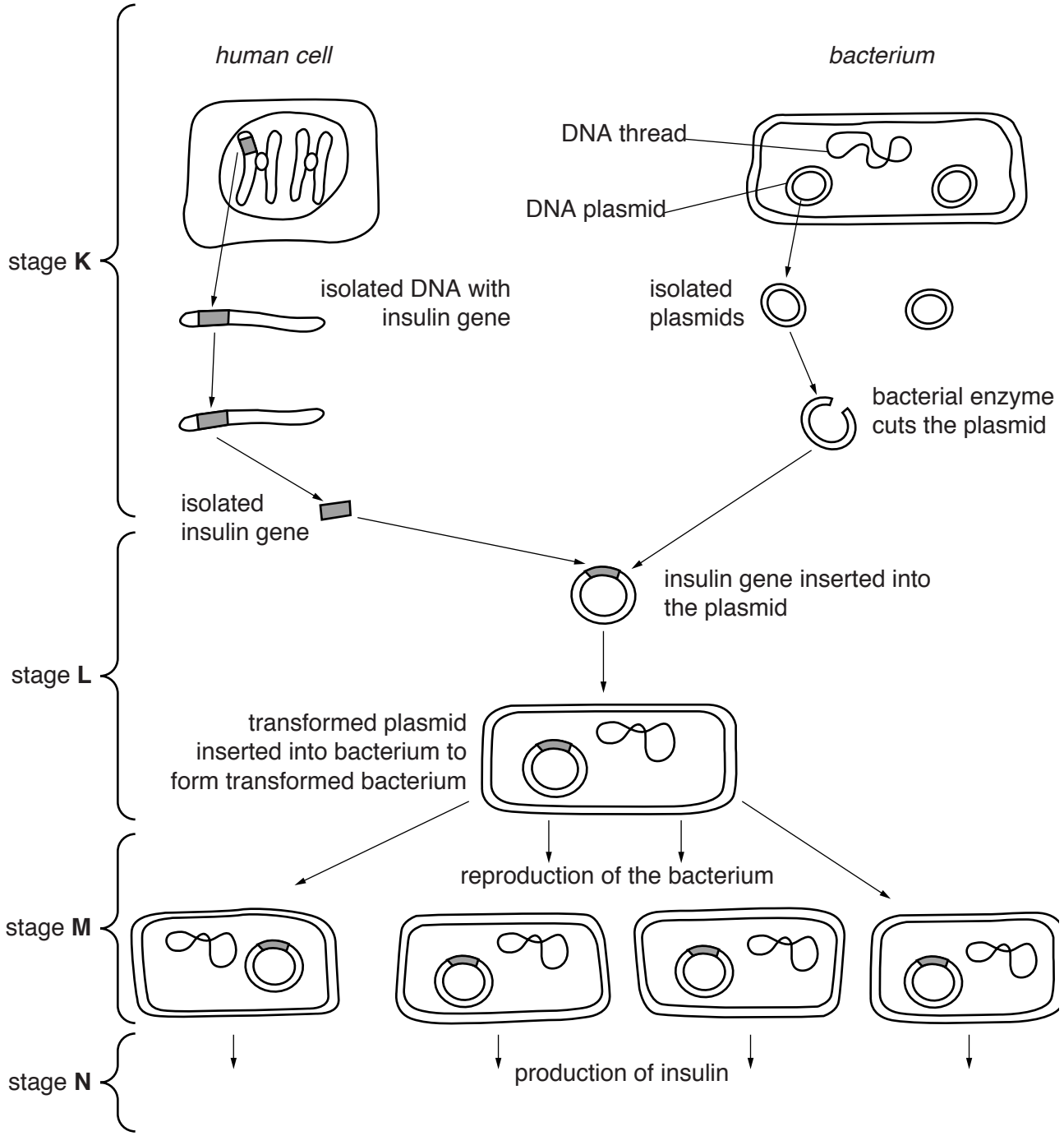


Fig. 4.1

(a) (i) Describe how the location and organisation of genetic material in the human cell shown in stage **K** of Fig. 4.1 is different from that in the bacterial cell shown.

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..... [3]

(ii) Use your knowledge of bacterial cells to name **two** structures that the transformed plasmid must pass through to form a transformed bacterium in stage **L** of Fig. 4.1.

…… and …….. [2]

(iii) State the type of reproduction that takes place in stage **M** of Fig. 4.1. Use your knowledge of the process of cell division to explain why it is important that this type of reproduction occurs.

type of reproduction .....

explanation .....

.....

.....

..... [3]

(iv) Name the condition in humans that is treated using insulin produced by the bacteria in stage **N** of Fig. 4.1.

..... [1]

(v) Stage **N** of Fig. 4.1 may take place in a container similar to that used in the large-scale production of antibiotics.

State the name of this type of container.

..... [1]

(b) Genetic engineering can also be used to produce crop plants for humans to eat.

Discuss the potential advantages and dangers of using genetic engineering to produce crop plants for humans to eat.

advantages .....

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dangers .....

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..... [4]

[Total: 14]

5 Malaria is a disease caused by a parasite that is transmitted from one person to another by a vector.

(a) Name the vector of the parasite that causes malaria.

..... [1]

(b) **(i)** Spread of the vector may be controlled by using an insecticide.

State **two** other ways of controlling the spread of the vector.

1 .....

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2 .....

..... [2]

(ii) Resistance to the insecticide can appear in the vector population.

Describe how the process of natural selection may bring about resistance of the vector to insecticide.

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..... [4]

[Total: 7]

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Section B

Answer **both** questions in this section.

6 Enzyme **Q** is active in the human alimentary canal. Fig. 6.1 shows the effect of pH on the rate of reaction of enzyme **Q**.

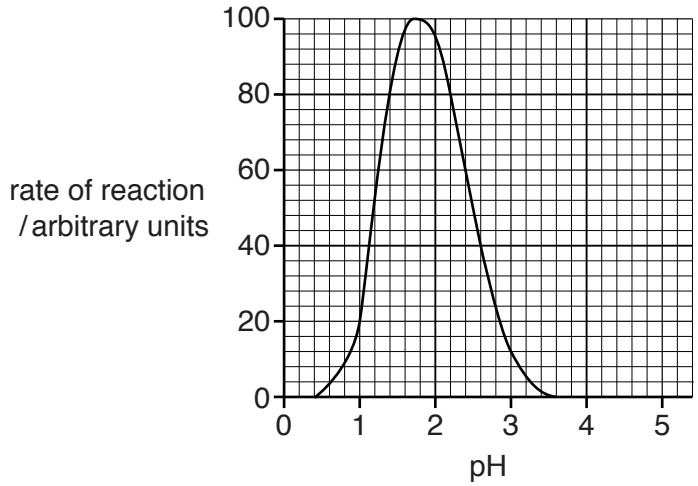


Fig. 6.1

(a) (i) Use the information in Fig. 6.1 to name the region of the alimentary canal where enzyme **Q** is active.

…….. [1]

(ii) Use your knowledge of the 'lock and key' hypothesis of enzyme action to explain why enzyme **Q** is active only in this region of the alimentary canal and not in any other region.

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..... [6]

(b) All enzymes contain carbon. List **three** other chemical elements that must be present in each molecule of an enzyme.

1 .....

2 .....

3 ..... [3]

[Total: 10]

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7 **(a)** Describe how the nitrogen cycle makes nitrogen in the air available for **both** plant and animal protein.

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..... [5]

(b) Nitrogen can also be made available in the form of nitrogen-containing fertilisers. Describe the possible effects of using nitrogen-containing fertilisers on each of the following:

the production of crops by farmers,

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the environment.

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..... [5]

[Total: 10]

Section C

Answer **either** question 8 **or** question 9.

8 The brain is one component of the nervous system.

(a) State **two** other components of the nervous system.

1 .....

2 .....[2]

(b) Fig. 8.1 shows the human brain.

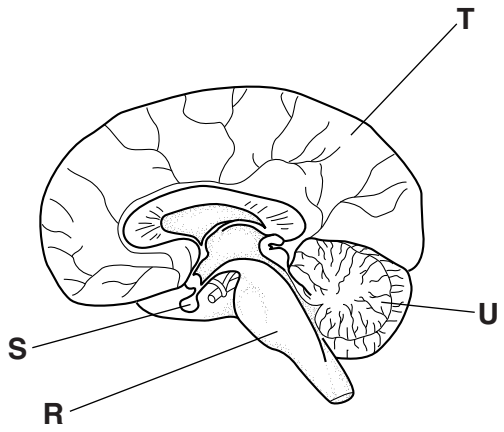


Fig. 8.1

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Name and describe the functions of parts **R**, **S**, **T** and **U**, labelled in Fig. 8.1, in terms of coordinating and regulating bodily functions.

R .....

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S .....

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T .....

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U .....

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..... [8]

[Total: 10]

9 **(a)** Define the term *drug*.

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..... [3]

(b) **(i)** Describe the effects on health of smoking tobacco. In your answer, make reference to the effects of **named** toxic components of tobacco smoke.

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..... [5]

(ii) Suggest why many people regard smoking tobacco as no longer socially acceptable.

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..... [2]

[Total: 10]

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