

Compiled by Biomath School

**BIOLOGY PAPER 2
QUESTIONS & ANSWERS**



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.

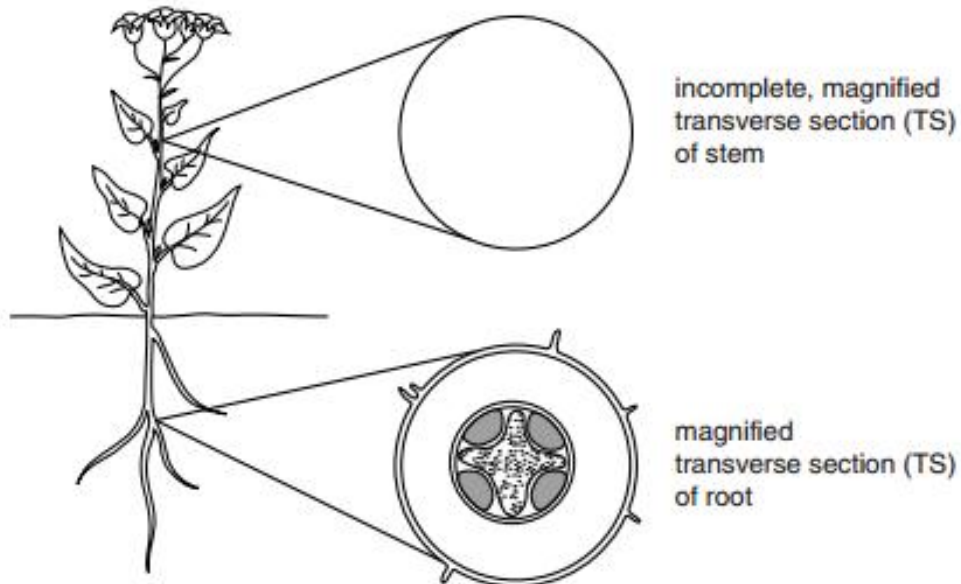


Fig. 1.1

- (a) The transverse section of the root in Fig. 1.1 shows the distribution of xylem and phloem tissue.
- 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]
 - Complete the transverse section (TS) of the stem in Fig. 1.1 to show the distribution of xylem and phloem tissue. [2]
 - Using a label line and the letter **P**, show the location of the phloem tissue that you have drawn. [1]

(b) State the functions of phloem tissue.

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.....
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..... [3]

[Total: 7]

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.

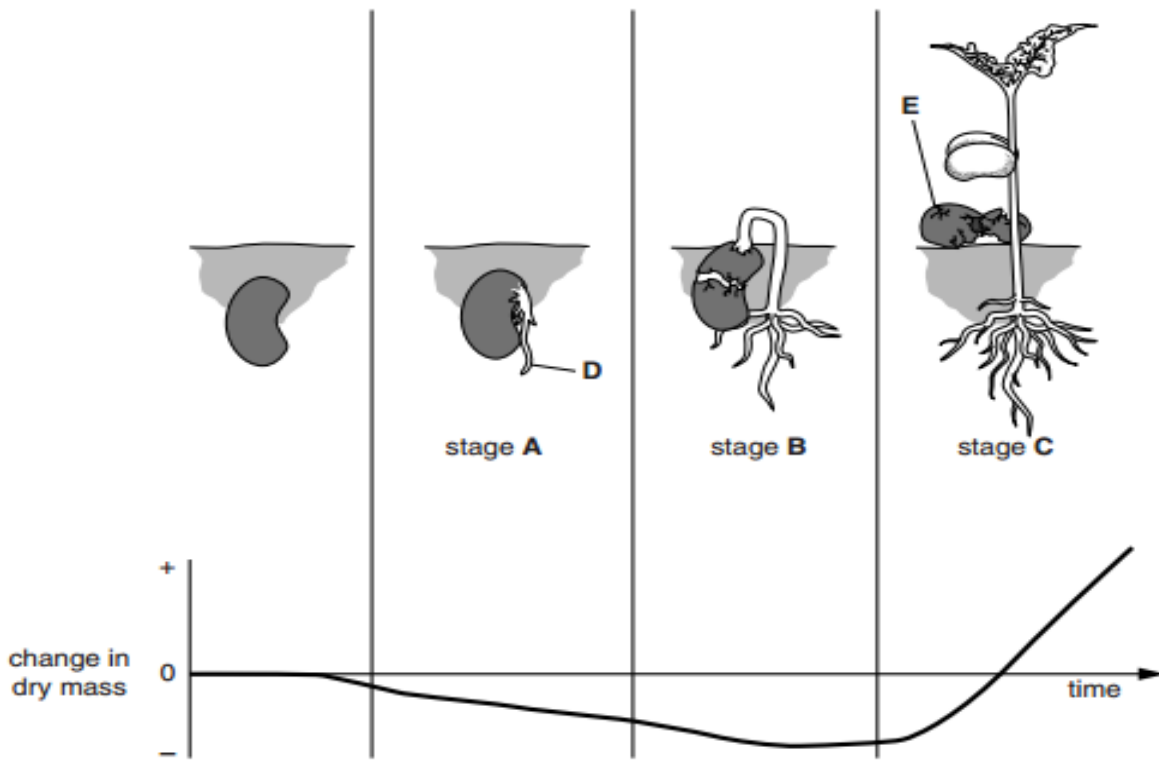


Fig. 2.1

(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

.....

..... [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.

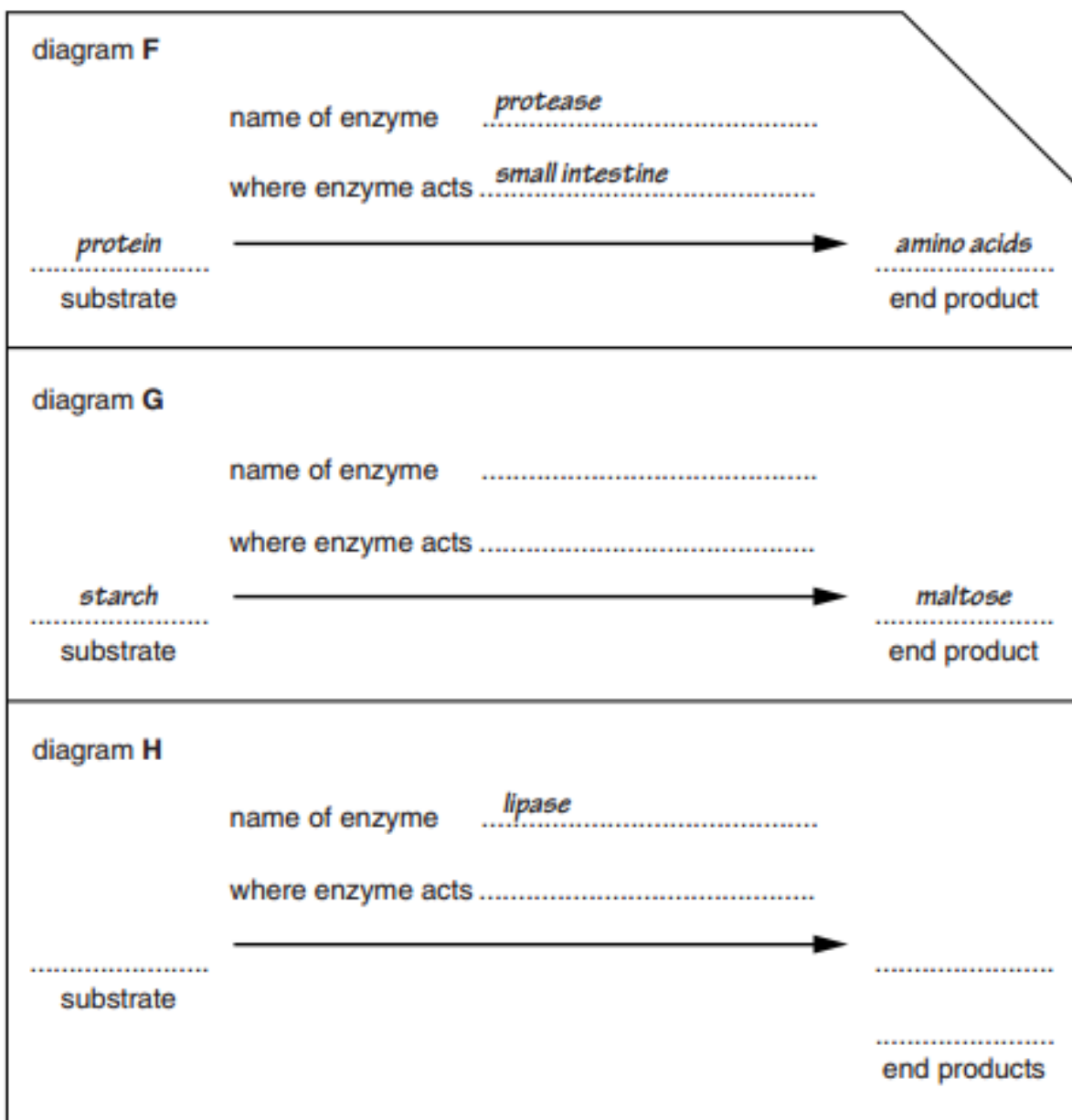


Fig. 3.1

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

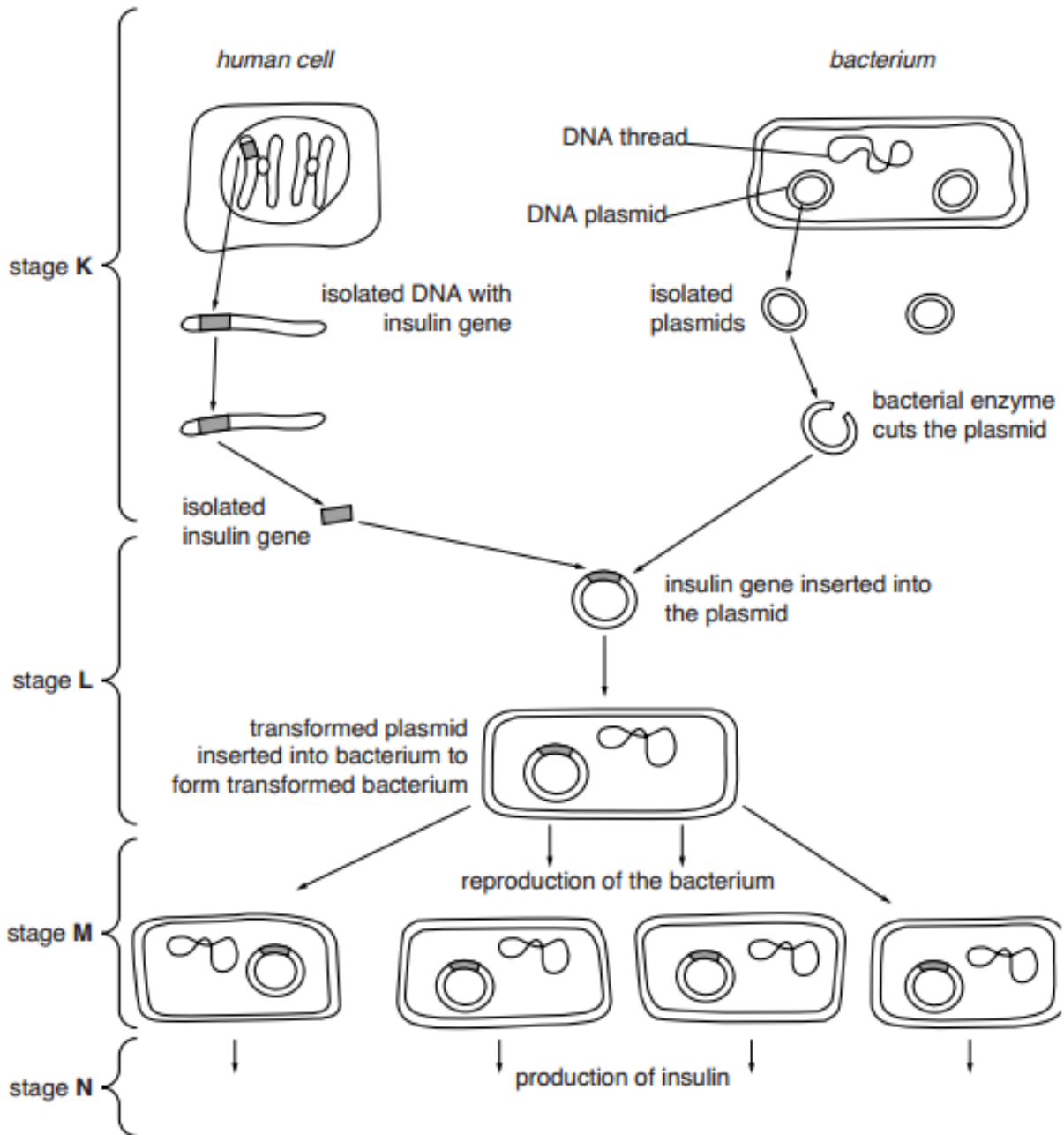


Fig. 4.1

(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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..... [5]

[Total: 10]

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.

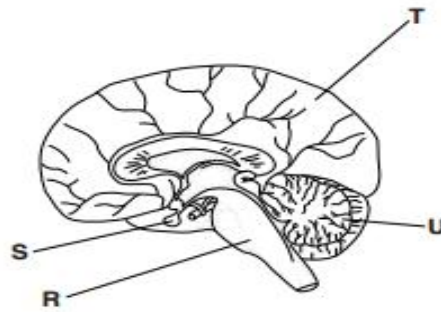


Fig. 8.1

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]

Solutions:

Question	Expected Answer
1 (a) (i)	Label line X on xylem on transverse section of root ;
(ii)	vascular bundle drawn towards outside of transverse section of stem ; vascular bundle divided into two sections ; three or more vascular bundles drawn ;
(iii)	label line P drawn in correct location (outer side of vascular bundle) ;
(b)	translocation ; transport ; dissolved / in solution ; sugar(s) / sucrose / products of photosynthesis ; amino acids ; reference from source + to sink / leaves to roots AW ;

Question	Expected Answer
2 (a)	radicle / root ; testa / seed coat ;
(b)	<p><i>stage A:</i> decreases ;</p> <p><i>stage B:</i> decreases ;</p> <p><i>explanation for A/B:</i> food store used ; reference to respiration ; reference to enzyme / named enzyme action ;</p> <p><i>stage C:</i> increases ;</p> <p><i>explanation for C:</i> reference to photosynthesis ; reference to production of named food compound ; reference to more cells made / tissue growth ;</p>
(c)	<p>oxygen ;</p> <p>reference to respiration ;</p> <p>energy + for growth ;</p> <p>suitable / correct temperature ;</p> <p>reference to enzyme ;</p> <p>breaks down food store AW ;</p>

Question	Expected Answer
<p>3 (a)</p>	<p><i>diagram G:</i> amylase ;</p> <p>mouth / small intestine / duodenum ;</p> <p><i>diagram H:</i> small intestine / duodenum ;</p> <p>fat / lipid / oil ;</p> <p>fatty acid (s) ;</p> <p>glycerol ;</p>
<p>(b)</p>	<p>reference to absorption / diffusion ;</p> <p>villi ;</p> <p>capillary ;</p> <p>blood / plasma ;</p> <p>reference to hepatic portal vein ;</p>

Question	Expected Answer
4 (a) (i)	<p>in nucleus (human)/within nuclear membrane ORA ;</p> <p>in cytoplasm (bacteria) ;</p> <p>thread + plasmid(s) (bacteria) ;</p> <p>correct reference to chromosomes AW ;</p> <p>genes/ chromosomes paired (human) ;</p>
(ii)	<p>(cell) wall ;</p> <p>(cell) membrane ;</p>
(iii)	<p><i>type:</i></p> <p>asexual/ binary fission/ mitosis ;</p> <p><i>explanation:</i></p> <p>genetically + identical (cells produced)</p> <p>OR clones ;</p> <p>all capable of producing insulin/ same product ;</p>
(iv)	<u>diabetes</u> ;
(v)	<u>fermenter</u> ;

Question	Expected Answer
(b)	<p><i>potential advantages:</i> increased yield / more profitable / grow quicker / reduce famine AW ;</p> <p>able to grow in environmental extremes / grow in new areas ;</p> <p>more predictable results than selective breeding / more certain ;</p> <p>able to transfer (beneficial) genes / features between species ;</p> <p>nutritionally improved / visually improved / desirable outcome e.g. uniform shape ;</p> <p>disease / pest resistance ;</p> <p><i>potential dangers:</i> risk of genetic spread to other species ;</p> <p>may be patented / costs too much ;</p> <p>possible (unknown) risk to health of other species ;</p> <p>possible (unknown) risk to genes of other species ;</p>

Question	Expected Answer
5 (a)	mosquito / <i>Anopheles</i> ;
(b) (i)	<p>drain swamps / prevent stagnation of water AW ;</p> <p>add oil on water ;</p> <p>reference to biological control / fish or bacteria into ponds ;</p> <p>release irradiated males ;</p>
(ii)	<p>(resistant) reproduce ;</p> <p>reference to (resistant) allele / gene ;</p> <p>inherited / passed on ;</p> <p>reference to repetition over many generations ;</p> <p>(resistant) become more common ;</p> <p>reference to <u>evolution</u> ;</p>

Question	Expected Answer
6 (a) (i)	<u>stomach</u> ;
(ii)	enzyme and substrate are lock and key ; reference to optimum pH / (hydrochloric) acid (in stomach) ; active site ; complementary AW ; substrate ; if pH changes / alkaline ; enzyme denatured / changes shape AW ; (substrate) no longer fits ;
(b)	<u>hydrogen</u> ; <u>oxygen</u> ; <u>nitrogen</u> ;

Question	Expected Answer
7 (a)	fix / convert / change / turn (nitrogen in air) ; reference to lightning ; reference to bacteria ; legumes (peas / beans) / root nodules ; to ammonium ; to nitrates ; (nitrates) absorbed + by plants ; reference to amino acids (in either plants or animals) ; plants + eaten by animals ; protein digested (in animals) ;

<p>(b)</p>	<p><i>production of crops:</i></p> <p>increases / increased yield ;</p> <p>(due to) improved <u>growth</u> ;</p> <p>increased profit / AW ;</p> <p><i>environment:</i></p> <p>reference to positive effect on environment e.g. more photosynthesis reduces CO₂ / increases O₂ / more wild plants for insects ;</p> <p>growth of weeds ;</p> <p>leaching (into water sources) AW ;</p> <p>eutrophication or process described ;</p> <p>death of aquatic life ;</p> <p>possible contamination / pollution of (drinking) water ;</p>
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Question	Expected Answer
8 (a)	spinal cord ; nerves / neurones ; named receptor / sense organ ;
(b)	R + medulla ; control of heart rate / breathing / involuntary actions ; relay of impulses between brain and spinal cord ; S + pituitary gland ; secretes / releases hormone(s) ; example of named hormone released + correct function ; T + cerebrum / cerebral hemispheres ; voluntary movement or example of ; thought / memory / any other acceptable function ; U + cerebellum ; coordination of movement ; maintenance of posture / balance ;

Question	Expected Answer
9 (a)	externally administered ; substance / chemical ; (that) modifies / affects / changes ; (the) chemical reactions (in the body) ;
(b) (i)	nicotine ; addictive ; carbon monoxide ; reduced oxygen carrying capacity of blood ; reference to underweight babies AW ; tar ; cough / emphysema / bronchitis ; explanation of mechanism of one of the above e.g. cilia damaged / alveoli damaged / mucous lining blocked by tar ; correctly named cancer (e.g. lung / throat) ; reference to cardiovascular disease / increases blood pressure ;

Question	Expected Answer
(ii)	passive smoking or described e.g. effect on asthmatics / concerns around smoking near children / pregnant mothers ; reference to unpleasant odour / clothes smell ; reference to high cost ;