

Revision Sheet

IGCSE Biology · Unit 21 Biotechnology and genetic modification

6 vocabulary items · 32 marks of exam questions (10 questions)

Part 1 · Vocabulary review (6 items). The terms this unit is examined on most. Mark it yourself from the answer key.

Section A · Chinese to English

Write the English word.

- | | | |
|----|-------|-----|
| 1. | <hr/> | [1] |
| 2. | <hr/> | [1] |
| 3. | <hr/> | [1] |
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| 5. | <hr/> | [1] |
| 6. | <hr/> | [1] |

Part 2 · Exam questions (32 marks, 10 questions) begins on the next page. They are ordered easy to difficult and none of them has been set before.

7 Which types of organisms are used in genetic modification because they have plasmids?

☐

- A** arachnids
- B** bacteria
- C** myriapods
- D** ferns

8 What is an example of the use of genetic modification in agriculture?

☐

- A** choosing cattle to breed so that alleles for high milk yield will be passed on to their offspring
- B** increasing food production by using insecticides to improve quality and yield
- C** inserting genes into crop plants to improve the nutritional qualities of the plant
- D** selecting crop plants with desirable characteristics and crossing these to produce the next generation

9 A crop plant has been genetically modified to make it resistant to herbicides.

☐

What is a possible disadvantage of introducing this new crop plant?

- A** The loss of weeds reduces competition.
- B** Some of the weeds might become resistant to the herbicide.
- C** The crop plant is unharmed and produces a higher yield.
- D** The new gene will appear in new generations of the crop plant.

10 Which statement about genetic modification is correct?

☐

- A** It involves choosing which individual organisms are used for breeding.
- B** It is always done using genes from the same species.
- C** It produces a new combination of genes.
- D** It produces exact copies of individual organisms.

11 Which substance is an enzyme used in fruit juice production?

☐

- A** lactase
- B** maltose
- C** pectinase
- D** pepsin

12 Penicillin is made in a fermenter by growing organisms.

☐

Which type of organism is used in the production of penicillin?

- A** bacterium
- B** fungus
- C** protocist
- D** virus

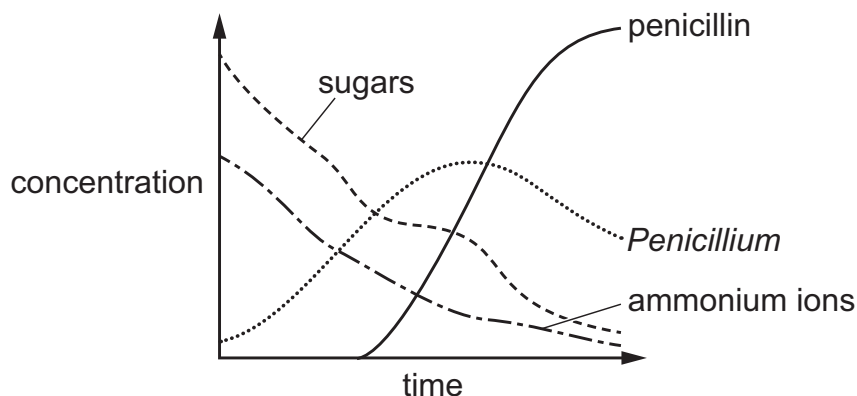
13 Fermenters must have carefully controlled conditions.

☐

Which condition has the correct reason for controlling it?

	condition to be controlled	reason for controlling condition
A	supply of amino acids	for carbohydrate synthesis
B	supply of glucose	waste product to be removed
C	supply of oxygen	for anaerobic respiration
D	pH	to be optimum for enzyme activity

14 The graph shows how much penicillin is produced by the fungus *Penicillium* in a fermenter. It also shows the concentrations of sugars, ammonium ions and *Penicillium*. *Penicillium* uses sugars as a food source and needs ammonium ions.

☐

What does the graph show about the conditions needed for penicillin production?

- A** A high concentration of ammonium ions must be maintained.
- B** Most penicillin is produced when nutrient concentrations are low.
- C** *Penicillium* cannot produce penicillin when its concentration decreases.
- D** Sugars must be added constantly to the fermenter.

15 (a) Fig. 1.1 is a photograph showing different stages of bread-making.

Bread dough is made by mixing flour, water and yeast together.

Bread dough **A** has just been mixed.

Bread dough **B** was mixed a few hours before the photograph was taken and has increased in volume.



Fig. 1.1

(i) State the name of the gas that caused bread dough **B** to increase in volume.

..... [1]

(ii) State the name of the process in yeast that produces the gas during bread-making.

..... [1]

(b) State **one other** product that is made using yeast, apart from food or drink.

..... [1]

(c) Bacteria are another type of microorganism that is used in biotechnology.

Tick **two** boxes to show why bacteria are useful in biotechnology.

cause disease	
have the same structure as plant cells	
make complex molecules	
have a rapid reproduction rate	
reproduce sexually	

[2]

(d) Bacteria and yeast are living organisms.

Table 1.1 shows descriptions of some characteristics of living organisms.

Complete Table 1.1 by writing the name for each characteristic described.

Table 1.1

description	name
the ability to detect and respond to changes in the internal or external environment	
the removal of the waste products of metabolism and substances in excess of requirements	
a permanent increase in size and dry mass	

[3]

(e) State **two** cell structures that are found in both bacteria and plants.

1

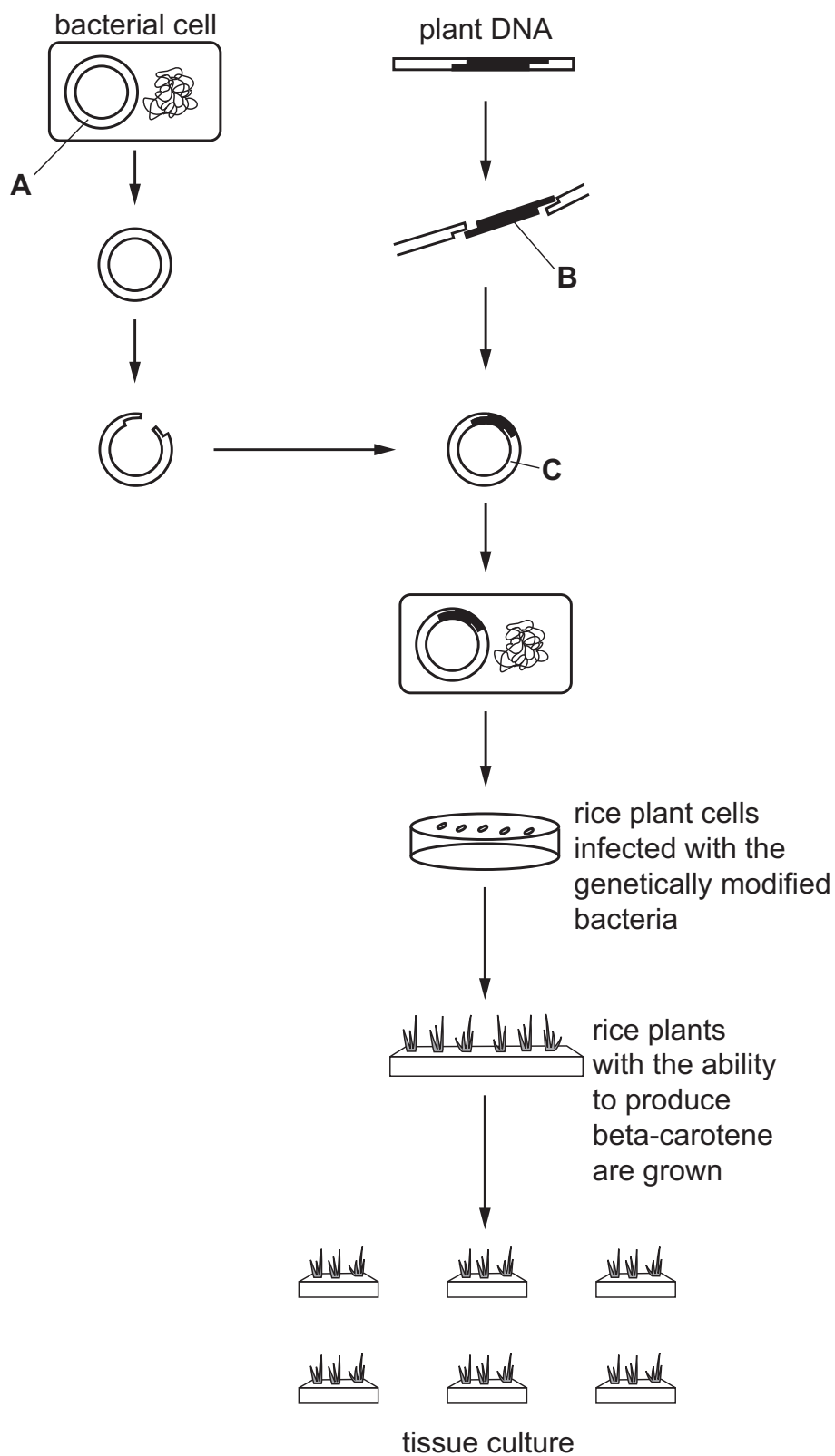
2

[2]

[Total: 10]

- 16** Golden rice is a type of rice that has been genetically modified to contain a nutrient called beta-carotene.

Fig. 6.1 shows the genetic modification process used to produce golden rice.



not to scale

Fig. 6.1

- (a) Using the information in Fig. 6.1, complete the sentences to describe how rice is genetically modified to contain beta-carotene.

The part labelled **A** in the bacterial cell is a

Part **A** is extracted and cut using a enzyme forming ends.

The part labelled **B** is the that codes for the production of beta-carotene.

The enzyme used to cut part **A** is also used to cut part **B** from the plant DNA.

Part **B** is inserted into the part labelled **A** using the enzyme

This forms the part labelled **C**, which is called a

Part **C** is put into a bacterium. The bacterium is taken up by rice plant cells, giving them the ability to produce beta-carotene.

Tissue culture is a form of reproduction that is used to produce many identical rice plants producing beta-carotene for commercial use.

[7]

- (b) Apart from structural features, state **two** reasons why bacteria are useful for genetic modification.

1

2

[2]

(c) Discuss the disadvantages of genetically modifying rice plants to produce beta-carotene.

[3]

(d) Beta-carotene is required to produce vitamin A, which is essential for eye function.

State the nutrient required to prevent:

scurvy

rickets.

[2]

[Total: 14]