Unit 13 · Biotechnology

WORKSHEET

Full marks 32

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 32

1 Key words [5]

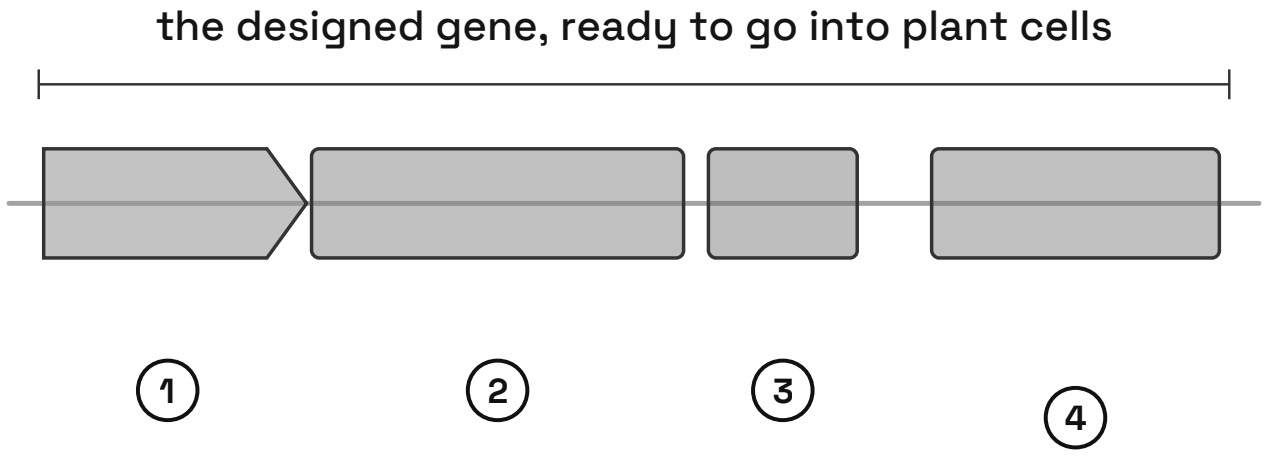
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

callus	**DNA ligase**	**emasculation**	**explant**	**green manure**	**hardening**	**mutagen**
plasmids	**restriction enzymes**	**totipotency**	**transgenic**	**triticale**		

The ability of a living plant cell to grow into a complete new plant is _____. The small piece of a plant taken to start a culture is the _____, and the unorganized mass of dividing cells it often grows into is a _____. Moving plantlets gradually from the culture jar to open air is _____. Removing the anthers of a flower before they shed pollen is _____. Enzymes that cut DNA at one particular short sequence are _____, and the enzyme that seals two pieces of DNA together is _____. Small rings of DNA in bacteria, used to carry genes, are _____. An organism carrying a gene from another species is _____. Legumes grown and plowed into the field while still green are _____.

2 Label the diagram [2]

The diagram shows a gene designed to be put into plant cells. Name each part 1 to 4 and say what it does. Each carries 0.5 mark.



1. _____ **2.** _____

3. _____ **4.** _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Producing enzymes for washing powder, using bacteria grown in large tanks, belongs to which area of biotechnology? [1]

a. red **b.** green
c. white **d.** blue

ii. Why is a flower of the female parent emasculated before a cross? [1]

a. so that it makes more nectar
b. so that its own pollen can't self-pollinate it
c. so that insects can reach the stigma
d. so that it produces haploid seeds

iii. A farmer's potato crop is weak because its tubers carry viruses. Which tissue culture technique would give virus-free plants? [1]

a. anther culture **b.** protoplast culture
c. meristem culture **d.** suspension culture

iv. Why does Bt toxin kill caterpillars but not the people who eat the crop? [1]

a. people wash it off the food
b. it is destroyed by cooking only
c. the crystals become toxic only in an insect's alkaline gut, which also has the receptors the toxin binds to
d. it kills only adult insects

v. A district grows plenty of rice, but many poor families can't afford to buy enough of it. Which component of food security is missing for them? [1]

a. availability **b.** access
c. utilization **d.** stability

4 Short answers [9]

Write short answers to the following questions.

a. Name two nitrogen-fixing biofertilizers, one symbiotic and one free-living, and say where each lives. [2]

b. Differentiate between a hazard and a risk in food safety, with an example. [2]

c. A breeder wants a new variety from one outstanding plant of wheat, and another from one outstanding sugarcane plant. Which selection method suits each, and why? **[2]**

d. Write any three uses of genetic engineering in medicine. **[3]**

5 Long answers **[8]**

Write long answers to the following questions.

a. What is hybridization in plant breeding? Describe its steps. **[4]**

b. Describe the five steps of making a genetically engineered crop. **[4]**

6 Think [3]

A farmer says, “Biofertilizers are natural, so I will stop using all chemical fertilizer and give my high-yielding maize only *Azospirillum*.” Explain what may happen, and give better advice.

7 Activity: Find the nitrogen factories (not marked)

Dig up a pea, bean, lentil or soybean plant in flower, with a lump of soil. Soak the roots in a bucket of water to loosen the soil, then look along the roots and cut a large swelling open.

What you looked at	What you saw
number of swellings on the roots	
their shape	
color inside a large one	

What lives in these swellings, and what does it do for the plant?