Name: _____ Group: _____ Date: _____

BIOTECHNOLOGY

STUDENT BOOK	Ch. 8, pp. 240–248

Processes: cell culture, genetic transformation (GMOs)

1. Use the following symbols to indicate if the descriptions below apply to:

- ○ biotechnology in general
- □ traditional biotechnology
- △ modern biotechnology

a) Technique used in medicine and the agro-food industry developed in the 18th century thanks to a better understanding of cells and DNA

b) Process that combines the study of living organisms and technology to meet certain wants or needs.

c) Technique used for millennia in the fields of food production, agriculture and breeding

2. For each technique described below, indicate if it refers to traditional biotechnology (T) or modern biotechnology (M), then if it refers to:

A. Cell culture	C. Transformation of food
B. Genetic transformation	D. Selective reproduction

		Biotechnology	Technique
a)	Production of goat cheese		
b)	Development of square tomatoes to facilitate storage		
c)	Modification of wheat genome to increase insect resistance		
d)	Large number of cells produced in a lab		
e)	Production of a sheep clone		
f)	Wheat plants containing selected characteristics after several generations		
g)	Use of yeast to make bread rise		
h)	Culture of stem cells to make new tissue		
i)	Selection of certain members of a breed of dog to keep it small in size		

Name: _____ Group: _____ Date: _____

Processes: cell culture, genetic transformation (GMOs) (*continued*)

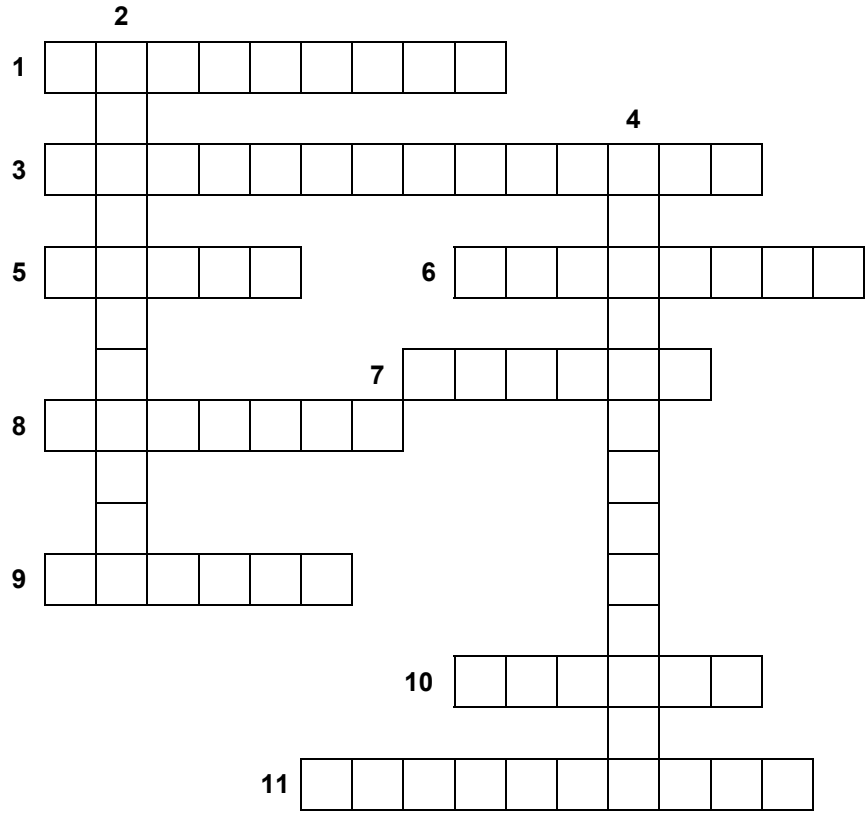
3. Complete the crossword puzzle below with the answers to the following definitions.

Across

1. Apparatus used to sterilize materials and media with water vapour
3. They are eliminated through the sterilization of culture mediums.
5. A living unicellular organism that is sometimes cultured.
6. An essential element in a culture medium
7. Phase in which the culture medium, also called broth, is found.
8. Process used to multiply cells outside their natural environment: cell _____
9. Cell cultures go through four phases during their _____.
10. Cells are cultivated in a _____ containing all the elements necessary to their growth.
11. Phase of cell culture that can result from a lack of nutrients in the cell culture.

Down

2. Organism made up of a single cell
4. Essential treatment to eliminate unwanted organisms in the culture medium



Name: _____ Group: _____ Date: _____

Processes: cell culture, genetic transformation (GMOs) (*continued*)

4. Place in ascending order from 1 to 6 the usual steps in the process used to obtain a GMO.

☐	Replication of a desired gene
☐	Culture of modified cells
☐	Identification of a characteristic that meets a specific want or need
☐	Identification and isolation of the gene responsible for the desired characteristic
☐	Identification of a want or need
☐	Transfer of the gene in the cells of the organism to be modified

5. For each of the following statements on GMOs, place a checkmark in the appropriate column to identify it as a benefit or a concern.

	Benefit	Concern
a) Production of more nutritious and less allergenic foods	☐	☐
b) Spread of GMO pollen to neighbouring fields	☐	☐
c) Increased resistance to antibiotics	☐	☐
d) Modification of certain genes in a single generation	☐	☐
e) Decrease of biodiversity	☐	☐
f) Production of insect-resistant plants	☐	☐

6. True or false?

a) Corn is the most cultivated cereal plant in the world and has spawned the development of many GMOs. _____

b) Only plants and bacteria can be genetically modified. _____

c) Cloning involves genetic transformation. _____

d) In Canada, GMOs are closely monitored by government agencies. _____

e) Most plants produced in Québec are GMOs. _____

f) The marketing of animal GMOs is legal in Canada. _____

g) The development of animal GMOs is more complex than that of plants. _____

7. Match the genetic modification to the animal or plant that is used or could be used if permitted by law.

Genetic modification	Organism
a) Increased growth rate	1. Peanut
b) Decrease of allergenic properties	2. Canola
c) Production of lactose-free milk	3. Cow
d) Resistance to herbicides	4. Salmon

Name: _____ Group: _____ Date: _____

BIOTECHNOLOGY (*continued*)

STUDENT BOOK	Ch. 6, pp. 251–260

Pasteurization, manufacture of vaccines, medically assisted reproduction

1. True or false?

a) Pasteurization is the boiling of foods for the purpose of sterilization. _____

b) Foods in solid form are the most frequently pasteurized. _____

c) Laws in Canada require that certain foods be pasteurized to lower their health risk. _____

d) Pasteurization is a process used to eliminate harmful microorganisms from foods. _____

e) The temperature and duration of pasteurization depend on the nature of the food. _____

f) Pasteurization alters the taste and nutritional value of foods. _____

g) Pasteurization helps to prolong the shelf life of foods. _____

2. Although a food is pasteurized, it must still be properly refrigerated. Circle the correct reason.

a) Microorganisms proliferate in cold temperatures.

b) Pasteurization does not kill all microorganisms.

c) Pasteurization destroys useful bacteria.

3. Match each of the following terms to the corresponding description.

Infectious agent	Immunity	Immune response	Vaccine
Inactive vaccine	Live vaccine	Vaccination	

a) Invader that causes a disease. _____

b) Production of antibodies to fight against an infectious agent that is more rapid and intense on secondary exposure. _____

c) Resistance of an organism to a disease-causing infectious agent _____

d) Process that introduces attenuated infectious agents into an organism to provoke an immune response. _____

e) Preparation capable of protecting an organism against one or more diseases _____

f) To manufacture it, a chemical treatment is used to remove the infectious agent's capacity to cause disease. _____

g) Manufactured using only the antigen of its infectious agent _____

Name: _____ Group: _____ Date: _____

Pasteurization, manufacture of vaccines, medically assisted reproduction (*continued*)

4. What is the purpose of vaccination? Circle the answers that apply.

a) Show the immune system how to fight against an infectious agent.
b) Cure all diseases.
c) Beat cancer.
d) Protect individuals against certain diseases.
e) Replace the immune system.

5. Place the stages of vaccine manufacture in order from 1 to 3. Indicate if the process refers to live or inactive vaccine production.

a) Traditional method of _____ vaccine manufacture.

	Isolation of antigens
	Culture of infectious agent
	Addition of pharmaceutical products

b) Method of _____ vaccine manufacture by genetic transformation.

	Addition of pharmaceutical products
	Culture of modified infectious agent
	Genetic transformation of infectious agent

6. Place a check mark beside each statement that identifies a situation requiring medically-assisted reproduction.

a) Help women become pregnant after 12 months of unsuccessful trying. ☐
b) Help women have children more quickly. ☐
c) Help infertile couples to conceive a child. ☐
d) Help women who rarely ovulate to produce ova. ☐
e) Circumvent the problem of low sperm motility. ☐
f) Solve a fertilization problem. ☐
g) Enable all people to have children. ☐

Pasteurization, manufacture of vaccines, medically assisted reproduction (*continued*)

7. Match the following medically assisted reproduction techniques to the corresponding statement below.

A. Ovarian stimulation	C. In vitro fertilization
B. Artificial insemination	D. Fertilization by microinjection

a) Sperm is sometimes treated to increase sperm concentration. _____

b) This technique is sometimes used when sperm count is low or fertilization is problematic. _____

c) This technique is performed in four steps and requires a few days of preparation in the lab. _____

d) Medication is taken to help ovarian follicles reach maturity and release ova that can then be fertilized. _____

8. The following statements describe concerns raised by the use of biotechnology in medicine. Place a check mark in the appropriate column to indicate if the statement refers to vaccination or medically assisted reproduction.

Concern	Vaccination	Medically assisted reproduction
a) Selection of a child's physical characteristics	☐	☐
b) Cause allergic reactions	☐	☐
c) Cause resistant strains of a disease to emerge	☐	☐

9. What am I?

a) I am a cell that does not play a specific role in the organism. I can divide multiple times and also am able to transform. _____

b) I am devised to make sure certain moral principles are respected. _____