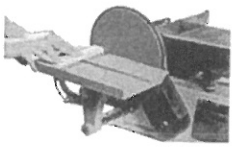
12. *a)* What is this object called?
Sander



b) What is its function?
Creating a smooth, polished finish

Section 5 • Biotechnology

Student textbook, pages 431 to 432

Pasteurization (*pages 413 to 415*)

1. Pasteurization is a process that prolongs a food's shelf life.
   a) Who developed this process?
   Louis Pasteur
   b) For which food was this process developed? *Wine*
   c) Name three products that can be pasteurized. *Milk, honey, fruit juice, jam*
   d) Besides the fact that it prolongs a food's shelf life, what else does pasteurization do? *It eliminates harmful bacteria found in certain foods.*

2. What are the two stages in pasteurizing a food? *The food must be heated at a specific temperature for a determined period of time, then cooled quickly.*

3. During pasteurization, what kills harmful micro-organisms? *Heat and time*

Vaccines (*pages 415 to 420*)

4. Vaccine manufacturing is a form of biotechnology that has saved more children's lives than any other health measure in Canada.
   a) What is a vaccine? *A vaccine is a substance that, when introduced into an organism, stimulates the immune system; the latter then manufactures specific antibodies and immunizes the individual against a given disease.*
   b) What is the purpose of vaccines? *Vaccines protect the health of people who receive them and prevent them from developing diseases with sometimes dangerous consequences.*
   c) Name three diseases for which vaccines exist. Various answers: e.g. *measles, whooping cough, hepatitis A, hepatitis B, chicken pox, flu, typhoid*

5. Why can't a vaccine containing viruses and bacteria cause disease? *The viruses or bacteria have been killed, inactivated or weakened, which means that they have lost their pathogenicity.*

6. Vaccines cause the body to produce effective antibodies against a single type of antigen. What are these antibodies called? *Specific antibodies*

7. Based on the following definitions, indicate which vaccine manufacturing process is being described:
   a) These vaccines are prepared from bacteria or viruses that have been inactivated using various methods. *Inactivated vaccines*
   b) To manufacture these vaccines, scientists use living viruses or bacteria whose genetic material has been modified, specifically by manipulating their DNA. *Vaccines derived from genetic engineering*

c) These vaccines are prepared from living bacteria or viruses. Scientists have selected strains whose power to cause disease has been lost. *Attenuated vaccine*

Assisted Reproduction (*pages 420 to 424*)

8. *a)* What is assisted reproduction? *Assisted reproduction is defined as all medical procedures that facilitate the union of an ovum and spermatozoon for the purposes of achieving fertilization.*

b) What is it used for? *It helps infertile or sterile couples to conceive a child.*

9. Associate one or more of the following procedures with the statements that follow:

- Hormonal treatment
- Artificial insemination
- *In vitro* fertilization
- Intracytoplasmic sperm injection

a) A specialist deposits the spermatozoa in the woman's uterus. *Artificial insemination*

b) In the laboratory, a specialist puts an ovum in contact with several thousand spermatozoa. In vitro *fertilization*

c) A specialist implants embryos in the woman's uterus. In vitro *fertilization, intracytoplasmic sperm injection*

d) This treatment is used to correct ovulation problems, or it is used in conjunction with artificial insemination or *in vitro* fertilization. *Hormonal treatment*

e) Fertilization takes place in the laboratory. In vitro *fertilization, intracytoplasmic sperm injection*

f) In the laboratory, a spermatozoon is inserted directly into an ovum. *Intracytoplasmic sperm injection*

g) A preimplantation diagnosis can be performed on embryos In vitro *fertilization, intracytoplasmic sperm injection*

10. Put the stages of *in vitro* fertilization in the right order.

1) Implantation of selected embryos
2) Collection of ova
3) Fertilization in the laboratory
4) Administration of a hormonal treatment to the woman
5) Growth of embryos
6) Collection and treatment of semen
7) Selection of embryos to implant

Answer: 4, 6, 2, 3, 5, 7, 1. On page 423 of the student textbook, fertilization in the laboratory (3) and growth of embryos (5) were combined.

Cell Cultures (*pages 425 to 427*)

11. *a)* What is cell culture? *A cell culture is a process by which cells are reproduced outside their natural environment i.e. outside the organism they originate from.*

b) What kinds of cells can be cultivated? *Unicellular micro-organisms, such as bacteria and yeast, or cells from multicellular organisms, such as plants and animals, can be cultivated.*

c) Name two applications of cell culture. *This technique helps researchers to understand how cells work. It is also used in the testing of medication and beauty products, and verifying the toxicity of chemical products. Cultivated cells are also instrumental in the production of certain vaccines. Furthermore, cell*