

Study Guide — PBS Unit 4: Innovation Inc (Pretest / Diagnostic Preview)

Principles of Biomedical Science · Unit 4 — Innovation Inc · Modeled on the PLTW Guided Review format

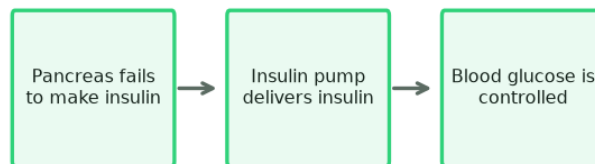
Vocabulary to know cold

Term	Definition
Biomedical device	An engineered device that supports, monitors, or replaces a body function (pacemaker, insulin pump, prost
Pacemaker	Implanted device that delivers electrical pulses to keep the heart beating at a regular rate; supports the car
Insulin pump	Device that delivers insulin (an endocrine hormone) to control blood glucose, replacing pancreatic function
Prosthesis	An artificial part that replaces a missing body structure, such as a limb; interfaces with the musculoskeletal
Dialysis	Artificial filtering of wastes and excess fluid from the blood when the kidneys (urinary system) fail.
Vital signs	Basic measures of body function: temperature, pulse (heart rate), respiratory rate, and blood pressure.
cardi/o	Word root meaning heart (as in cardiology, cardiovascular).
pulmonary	Term meaning relating to the lungs (respiratory system).
-ectomy	Suffix meaning surgical removal (appendectomy = removal of the appendix).
Distal	Directional term meaning farther from the trunk or point of attachment (the hand is distal to the elbow).
Clinical trial	A controlled study in people that tests whether a treatment or device is safe and effective before approval.

Worked examples (follow the reasoning)

Example 1. A patient's pancreas cannot make enough insulin. An engineer designs a wearable pump to help. Name the body system involved and explain how the device interfaces with it.

Insulin pump and the endocrine system



- Insulin is a hormone, and hormones are made by the endocrine system.
- In diabetes the pancreas (an endocrine organ) does not supply enough insulin.
- The pump delivers measured doses of insulin into the body.
- This replaces the missing endocrine function and keeps blood glucose in range.

Answer: The device supports the endocrine system by delivering the hormone insulin that the pancreas can no longer supply.

Example 2. Match each device to the body system it most directly supports: pacemaker, dialysis machine, leg prosthesis.

- A pacemaker paces the heart's electrical rhythm -> cardiovascular system.
- A dialysis machine filters the blood like a kidney -> urinary system.
- A leg prosthesis replaces a limb and works with bone and muscle -> musculoskeletal system.
- Each device restores or replaces a specific organ-system function.

Answer: Pacemaker = cardiovascular, dialysis = urinary, leg prosthesis = musculoskeletal.

Practice questions (with reasoning)

1. A cochlear implant restores hearing by stimulating which system?

- A. Endocrine system
- B. Nervous (sensory) system
- C. Urinary system
- D. Skeletal system

Answer: B. Hearing is a sensory function of the nervous system, which the implant stimulates.

2. The root 'cardi/o' means:

- A. Lung
- B. Heart
- C. Kidney
- D. Liver

Answer: B. Cardi/o is the root for heart.

3. Dialysis takes over the function of which organ?

- A. Liver
- B. Lung
- C. Kidney
- D. Stomach

Answer: C. Dialysis filters the blood, the job of the kidneys.

4. Which is a vital sign measured by a biomedical monitor?

- A. Blood pressure
- B. Anatomical plane
- C. Word root
- D. Body cavity

Answer: A. Blood pressure is one of the four standard vital signs.