

Study Guide — PBS Unit 4: Innovation Inc (Mid-Unit Test)

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

Vocabulary to know cold

Term	Definition
Cardiac conduction system	Heart structures (SA node, AV node, bundle of His, Purkinje fibers) that generate and spread the electrical
SA node	The heart's natural pacemaker in the right atrium; an artificial pacemaker takes over when it fails.
tachy- / brady-	Prefixes meaning fast / slow; tachycardia = fast heart rate, bradycardia = slow heart rate.
Insulin / pancreas	Insulin is the hormone (from the pancreatic islets) that lowers blood glucose; supplied by an insulin pump in
myo-	Combining form meaning muscle; a myoelectric prosthesis reads muscle electrical signals.
Hinge joint	A joint allowing flexion and extension in one plane (knee, elbow); replaced by a hinge-type prosthetic joint.
Proximal / distal	Proximal = closer to the trunk/attachment point; distal = farther from it (knee is proximal to foot).
Nephron	The kidney's functional filtering unit; its job is replaced by a dialysis machine.
nephro	Root meaning kidney (nephrology, nephron).
Alveoli	Tiny air sacs in the lungs where oxygen and carbon dioxide are exchanged with blood; supported by a ven
hypo- / hyper-	Prefixes meaning below/low / above/high; hypoglycemia = low blood glucose, hyperglycemia = high blood
Biomedical engineer	Professional who designs and tests medical devices such as prostheses, pacemakers, and dialysis equipm

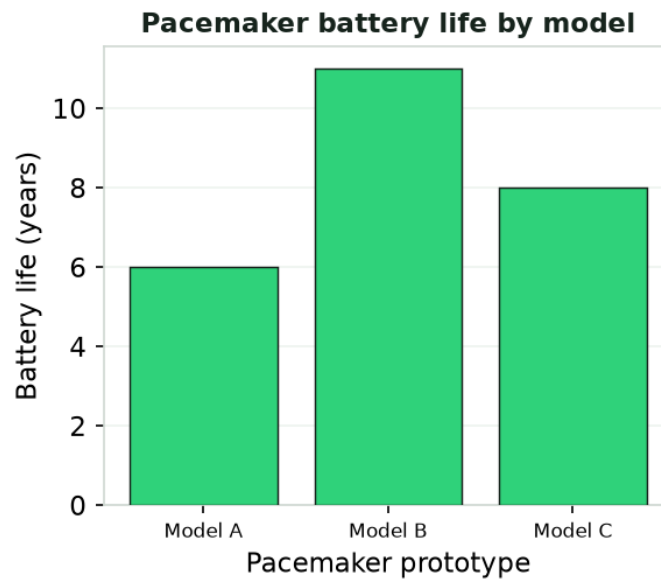
Worked examples (follow the reasoning)

Example 1. Break down the term 'tachycardia' into its parts and state what it means and which device might treat the opposite condition.

- Identify the prefix: tachy- means fast.
- Identify the root/suffix: -cardia refers to a heart condition.
- Combine: tachycardia = fast heart rate.
- The opposite, bradycardia (slow heart rate), is often treated with a pacemaker that speeds pacing.

Answer: Tachycardia = a fast heart rate; its opposite bradycardia (slow rate) can be treated with a pacemaker.

Example 2. A biomedical engineer tests three pacemaker prototypes for battery life (Model A = 6 yr, Model B = 11 yr, Model C = 8 yr). Which should be recommended and why?



- Read each bar's height to get battery life in years.
- Compare: Model B (11) > Model C (8) > Model A (6).
- Longer battery life means fewer replacement surgeries for the patient.
- Recommend Model B for the longest service life.

Answer: Model B, because its 11-year battery life is longest and reduces how often the patient needs replacement surgery.

Practice questions (with reasoning)

1. The root 'nephro/' means:

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

Answer: B. Nephro/o means kidney.

2. Insulin's normal job in the body is to:

- A. Raise blood glucose
- B. Lower blood glucose
- C. Filter the blood
- D. Carry oxygen

Answer: B. Insulin lowers blood glucose by helping cells take it up.

3. Gas exchange in the lungs takes place in the:

- A. Trachea
- B. Bronchi
- C. Alveoli
- D. Pleura

Answer: C. The alveoli are the air sacs where oxygen and carbon dioxide are exchanged.

4. The knee is which type of joint, replaced by a hinge-type prosthesis?

- A. Ball-and-socket
- B. Hinge
- C. Pivot
- D. Fixed

Answer: B. The knee is a hinge joint allowing flexion and extension.

5. 'Proximal' means a structure is:

- A. Farther from the trunk
- B. Closer to the trunk
- C. Toward the head
- D. Toward the back

Answer: B. Proximal means closer to the trunk or point of attachment.