The Booster Question

Trace how a tetanus vaccine protects the body

HAP.7.a "Obtain, evaluate, and communicate information explaining how vaccines work to stimulate immunity in the human body."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB As you read, underline what enters the body through a wound, circle what the vaccine contains, and number the steps that lead to protection. Use your marks to explain what the vaccine can and cannot do.

A Nail, a Wound, and a Vaccine

1. During a weekend repair, a student steps on a nail and asks whether a recent tetanus shot means the cut is harmless. Tetanus bacteria can enter through a break in the skin and make a toxin. The toxin can interfere with nerve signals, causing painful muscle spasms. A tetanus vaccine does not close the wound or kill bacteria on the nail. It prepares the immune system to respond to the toxin. Washing the wound and seeking medical advice still matter, especially for a deep or dirty puncture wound.

2. The tetanus shot contains a toxoid, a toxin changed so it cannot cause tetanus. The immune system treats the toxoid as a foreign substance. Helper T cells support B cells that make antibodies able to bind the real toxin. Some of these B cells become memory cells. If tetanus bacteria later make toxin in a wound, existing antibodies can bind the toxin before it harms nerve cells. Memory cells can also help produce more antibodies after exposure. The vaccine creates protection by training a response to a toxin, not by causing tetanus or coating the skin against bacteria.

3. Protection can fade as antibody levels decrease over time, so people may need booster shots. A booster renews the immune response and raises antibody levels before a possible exposure. Imagine two posts about tetanus: one says, 'The shot makes every wound safe because it kills bacteria.' The other says, 'The shot helps prevent illness by preparing antibodies to block a bacterial toxin.' To evaluate these claims, compare each proposed cause and effect with what the shot contains and what antibodies do. Even a well-vaccinated person needs wound care; a clinician can check whether another booster or other treatment is needed.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why can a person with a recent tetanus shot still need wound care after stepping on a nail? Explain what the shot protects against and what it does not do.

2. Trace how a tetanus shot can reduce the chance of muscle spasms after later exposure to tetanus bacteria. Include the toxoid, antibodies, and toxin.

3. A classmate claims that memory cells make booster shots unnecessary. How does the passage challenge that claim?

4. Which detail in the passage best tests the claim that the vaccine gives a person tetanus? Explain what the detail shows.

3 YOUR TURN

Your own words

Write a four-sentence note for a metalworking club before its next project. Explain how a booster strengthens protection, correct the claim that it sterilizes scratches, and tell members what to do after a dirty puncture wound.

ANSWER KEY

The Booster Question

PART 1 · READ AND MARK

As you read, underline what enters the body through a wound, circle what the vaccine contains, and number the steps that lead to protection. Use your marks to explain what the vaccine can and cannot do. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why can a person with a recent tetanus shot still need wound care after stepping on a nail? Explain what the shot protects against and what it does not do.	**The shot prepares antibodies to block tetanus toxin, but it does not close the wound or kill bacteria. The wound still needs care.**
2	Trace how a tetanus shot can reduce the chance of muscle spasms after later exposure to tetanus bacteria. Include the toxoid, antibodies, and toxin.	**The toxoid prompts the immune system to make antibodies. If bacteria later produce toxin, antibodies can bind it before it harms nerve cells and causes spasms.**
3	A classmate claims that memory cells make booster shots unnecessary. How does the passage challenge that claim?	**Memory cells can help make more antibodies after exposure, but antibody levels can decrease over time. A booster raises those levels before exposure.**
4	Which detail in the passage best tests the claim that the vaccine gives a person tetanus? Explain what the detail shows.	**The vaccine contains a toxoid, a toxin changed so it cannot cause tetanus. It stimulates an immune response without causing the disease.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Before our metalworking project, check whether your tetanus booster is up to date. A booster renews the immune response and raises antibodies that can block tetanus toxin. It does not sterilize scratches or stop bacteria from entering a wound. If you get a dirty puncture wound, wash it and seek medical advice.

Accept explanations that distinguish blocking the toxin from killing bacteria or treating a wound. Students should connect boosters to higher antibody levels before exposure, not claim that memory cells alone guarantee protection.