Signals That Shift

Trace how hormones change a response and how each loop ends.

HAP.6.a "Obtain, evaluate, and communicate information explaining how hormones secreted by endocrine glands help the body maintain homeostasis through negative and positive feedback loops."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Read the passage. For each of the three loops, underline the starting change, circle the hormone, number 1 the hormone's effect, and number 2 what slows or stops its release.

Two Ways to Respond

1. After a large bowl of rice, glucose from digestion enters the bloodstream. The pancreas detects the rise, and its beta cells release insulin into the blood. Insulin signals muscle and fat cells to take up more glucose. It also signals the liver to store glucose as glycogen. As blood glucose moves back toward its usual range, the pancreas releases less insulin. This is negative feedback: the response reduces the change that started it. The loop helps keep blood glucose from staying too high while leaving glucose available to fuel cells.

2. Hours after a meal, blood glucose may dip below its usual range. Alpha cells in the pancreas then release glucagon. Glucagon signals the liver to break down stored glycogen and release glucose into the blood. Once blood glucose rises toward its usual range, glucagon release decreases. This loop also uses negative feedback, but it corrects a drop rather than a rise. The two pancreatic hormones have different effects, so describing both as simply raising blood glucose would hide an important difference. Both responses help keep the internal environment stable as meals and activity change.

3. During labor, pressure from a baby's head stretches the cervix. Stretch signals reach the brain, which prompts the posterior pituitary gland to release oxytocin into the blood. Oxytocin strengthens uterine contractions. Stronger contractions press the baby's head harder against the cervix, producing more stretch signals and more oxytocin release. This is positive feedback: the response increases the original change instead of reducing it. The cycle continues until delivery removes the stretch that drives it. A positive loop can help finish a short process, but it needs a stopping event rather than an immediate return to the starting level.

2 ANSWER WITH EVIDENCE

Use the passage

1. Trace the steps that make insulin release a negative feedback loop after a meal.

2. A classmate says insulin and glucagon both raise blood glucose. Evaluate this claim using the passage.

3. Why does oxytocin release increase during labor as contractions grow stronger?

4. Someone says a positive feedback loop can never end. Use evidence from the passage to evaluate this claim.

3 YOUR TURN

Your own words

Imagine a fictional gland that releases hormone M when blood mineral Z falls. M makes the kidneys return more Z to the blood. In four or five sentences, explain the full feedback loop, name its feedback type, and compare its stopping signal with the labor loop.

ANSWER KEY

Signals That Shift

PART 1 · READ AND MARK

Read the passage. For each of the three loops, underline the starting change, circle the hormone, number 1 the hormone's effect, and number 2 what slows or stops its release. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Trace the steps that make insulin release a negative feedback loop after a meal.	**Blood glucose rises, so the pancreas releases insulin. Insulin helps cells take up glucose and the liver store it. As blood glucose returns toward its usual range, insulin release decreases.**
2	A classmate says insulin and glucagon both raise blood glucose. Evaluate this claim using the passage.	**The claim is incorrect. Insulin helps lower high blood glucose, while glucagon signals the liver to release glucose when blood glucose is low.**
3	Why does oxytocin release increase during labor as contractions grow stronger?	**Stronger contractions increase pressure on the cervix. The added stretch sends more signals that prompt oxytocin release, which strengthens contractions further.**
4	Someone says a positive feedback loop can never end. Use evidence from the passage to evaluate this claim.	**The claim is incorrect. Delivery removes the cervical stretch that drives oxytocin release, ending the labor loop.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

When blood mineral Z falls, the fictional gland releases hormone M. M makes the kidneys return more Z to the blood, so blood Z rises toward its usual range. As the low mineral signal fades, the gland releases less M, making this negative feedback. In labor, delivery removes cervical stretch and ends the signal that drives oxytocin release instead.

Accept equivalent cause-and-effect explanations. For the fictional loop, students should distinguish a response that reduces the starting change from the labor loop, which continues until delivery removes its starting signal.