

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Reaction Diagram Sandbox**. Click the **Start Drawing** button to begin. Read the introduction popup, which describes two interaction modes (Move and Assign), drawing tools for building reaction pathways, and key features including real-time energy calculations and solution checking.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Load the "5 Molecules - Complex Negative Feedback" preset template and click Run Simulation. Observe how the level of the final product changes over time. Then load the "4 Molecules - Positive Feedback Loop" template, run it, and compare how the two systems behave.

(A) (1 pt) **Describe** the effect of a negative feedback mechanism on a system that has been moved away from its set point.

(B) (1 pt) **Explain** why a positive feedback mechanism moves a variable further from its starting value instead of returning it.

(C) (1 pt) **Predict** what will happen to the amount of final product if a negative feedback relationship is added from that product back to the first reaction in the pathway.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

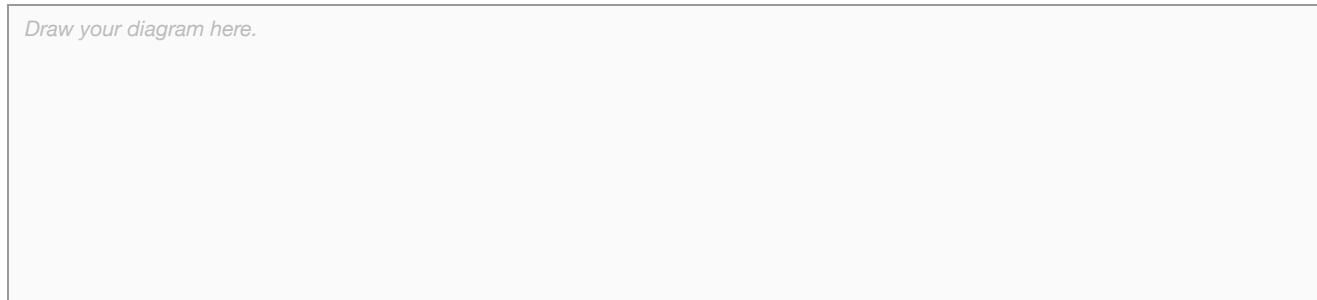
Simulation Task: Load the "5 Molecules - Cascade Inhibition" preset template. Use Assign Mode to inspect the relationship set on each arrow, noting which are reactions and which are inhibition. Drag Enzyme E1 onto one of the reaction arrows, click Run Simulation, and observe the effect on the pathway.

(A) (1 pt) **Describe** the order in which the molecules of the loaded cascade are connected, from the first molecule to the last.

(B) (1 pt) **Explain** why metabolic pathways release energy through multiple sequential steps rather than all at once.

(C) (1 pt) **Represent** the loaded pathway by drawing a labeled diagram that shows each molecule, the reaction arrows joining them, and the step at which inhibition acts.

Draw your diagram here.



(D) (1 pt) **Explain** how placing Enzyme E1 on a reaction arrow increases the rate of that step.

4.2.A.1, 3.3.A.3