

Equilibrium, Positive and Negative Feedback

- Most ecosystems are very complex. There are many flows and storages.
- A high level of complexity makes for a more stable system which can withstand stress and changes better than a simple one



If there is only one road and it is blocked it will devastate the system.

If there is a system with many options then the system can continue if one road is blocked.

You simply take a different path.



Equilibrium

- State of balance which exist between different parts of any system
- The need to return to normal state after a disturbance
- Disturbances happen only for a limited time.





The need to return to normal state after a disturbance

Each group will be assigned either:

steady-state equilibrium

- Examples: 1,2, & 3

steady-state equilibrium

- Examples: 4, 5, & 6

Negative feedback

- Examples: 1-3

Negative feedback

- Examples: 4 & 5

Static equilibrium

Unstable and stable equilibrium

Positive feedback

- Examples: 1 & 2

Positive feedback

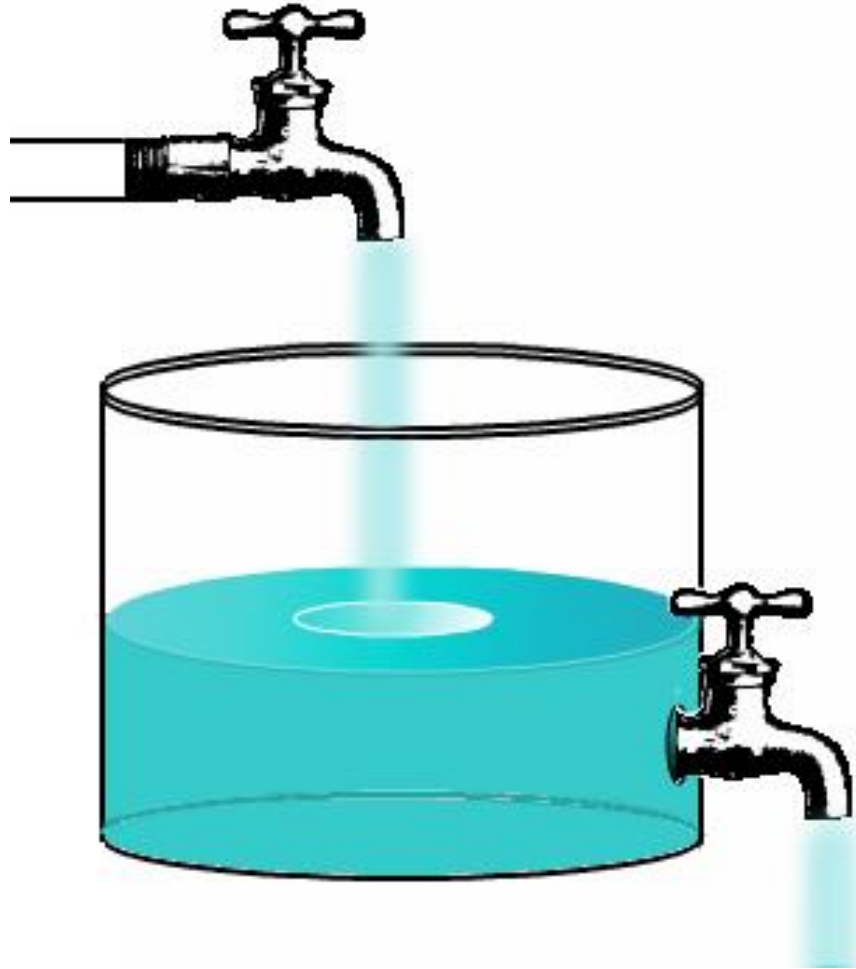
- Example: 3

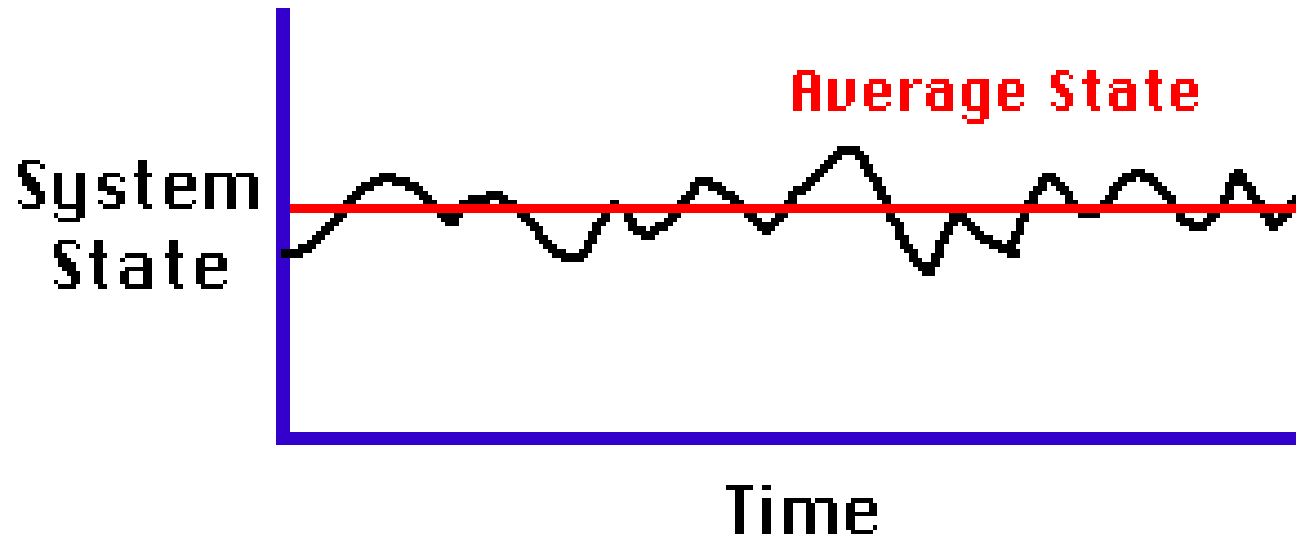
You will create a PPT defining and describing what you have been assigned. You also must have a graph and visual representation of it.

Steady state equilibrium

- Characteristic of open systems
- Continuous inputs and outputs of energy and matter
- No long term changes but there may be small fluctuations
- A stable form of equilibrium which allows a system to return to its steady state after a disturbance.

Steady State Equilibrium

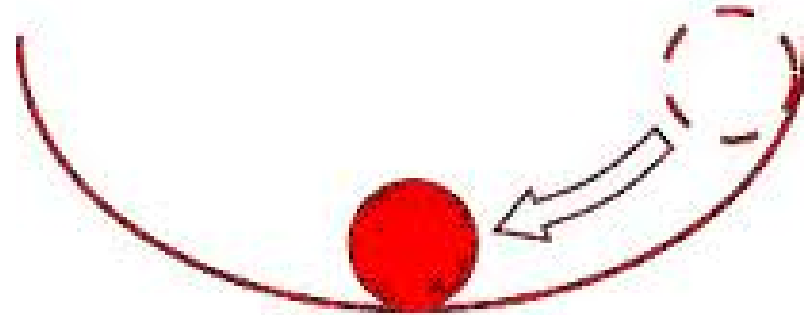
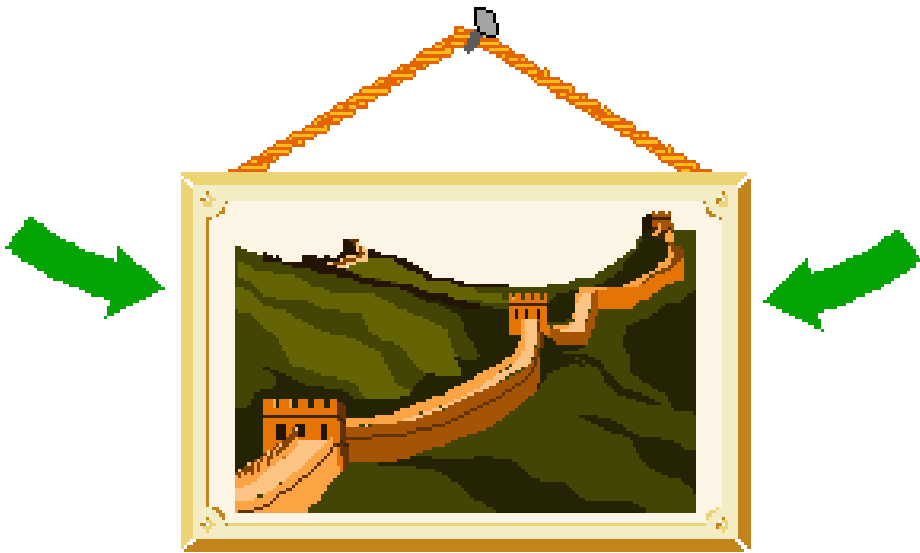




Steady state equilibrium is stabilized by negative feedback

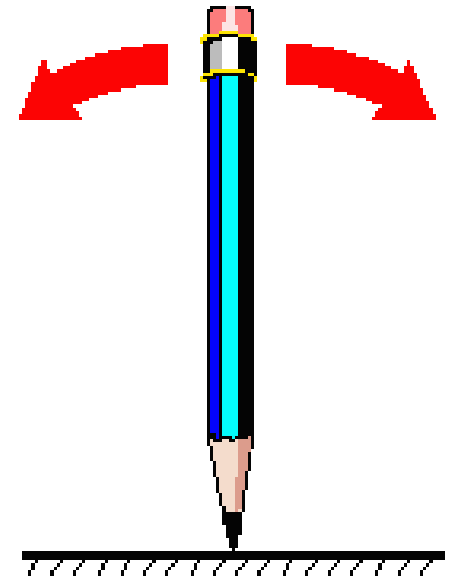
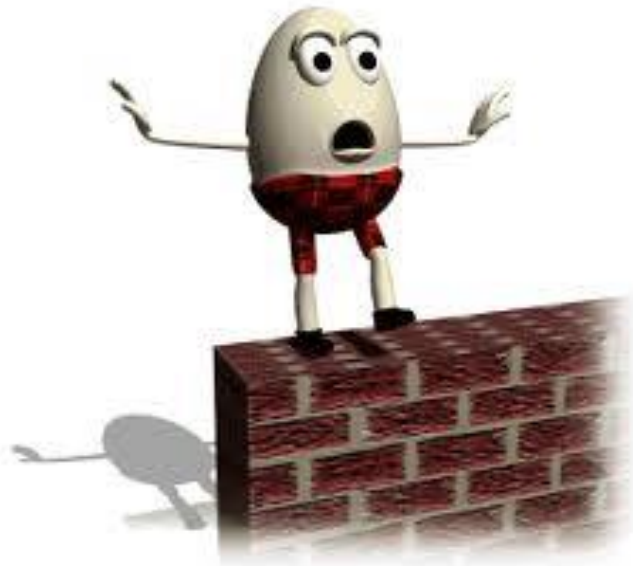
Stable/ unstable Equilibrium

- Stable:
- System returns to the same equilibrium after a disturbance



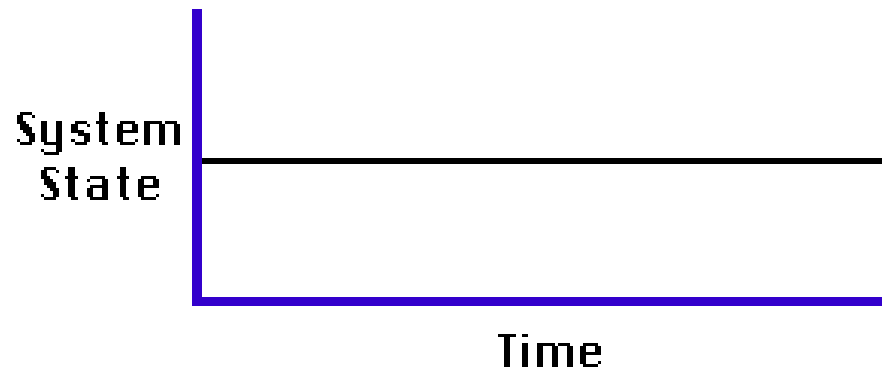
Stable/ unstable Equilibrium

- Unstable:
- System changes to a new equilibrium



Static Equilibrium

- No changes over time because there are no inputs or outputs to the system
- Non living system remain unchanged for long periods
- Rock formations, desk, or building

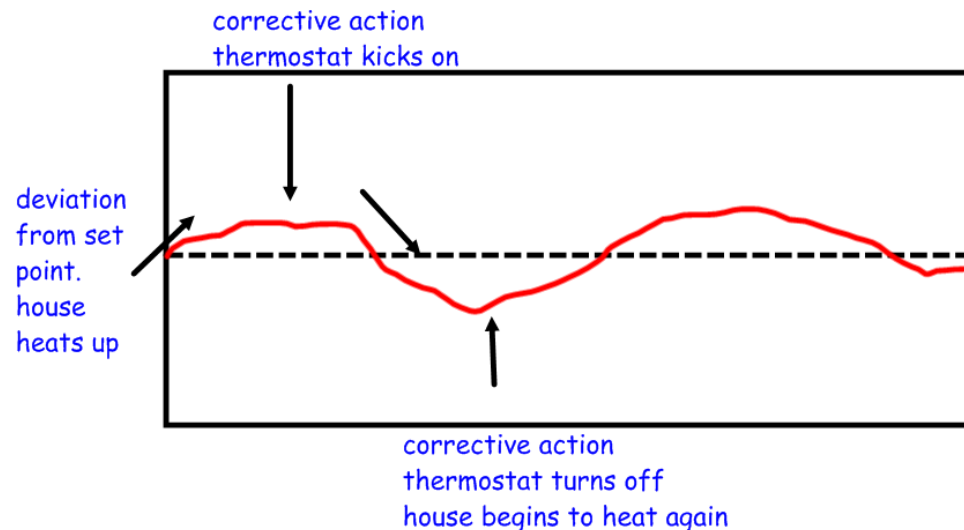


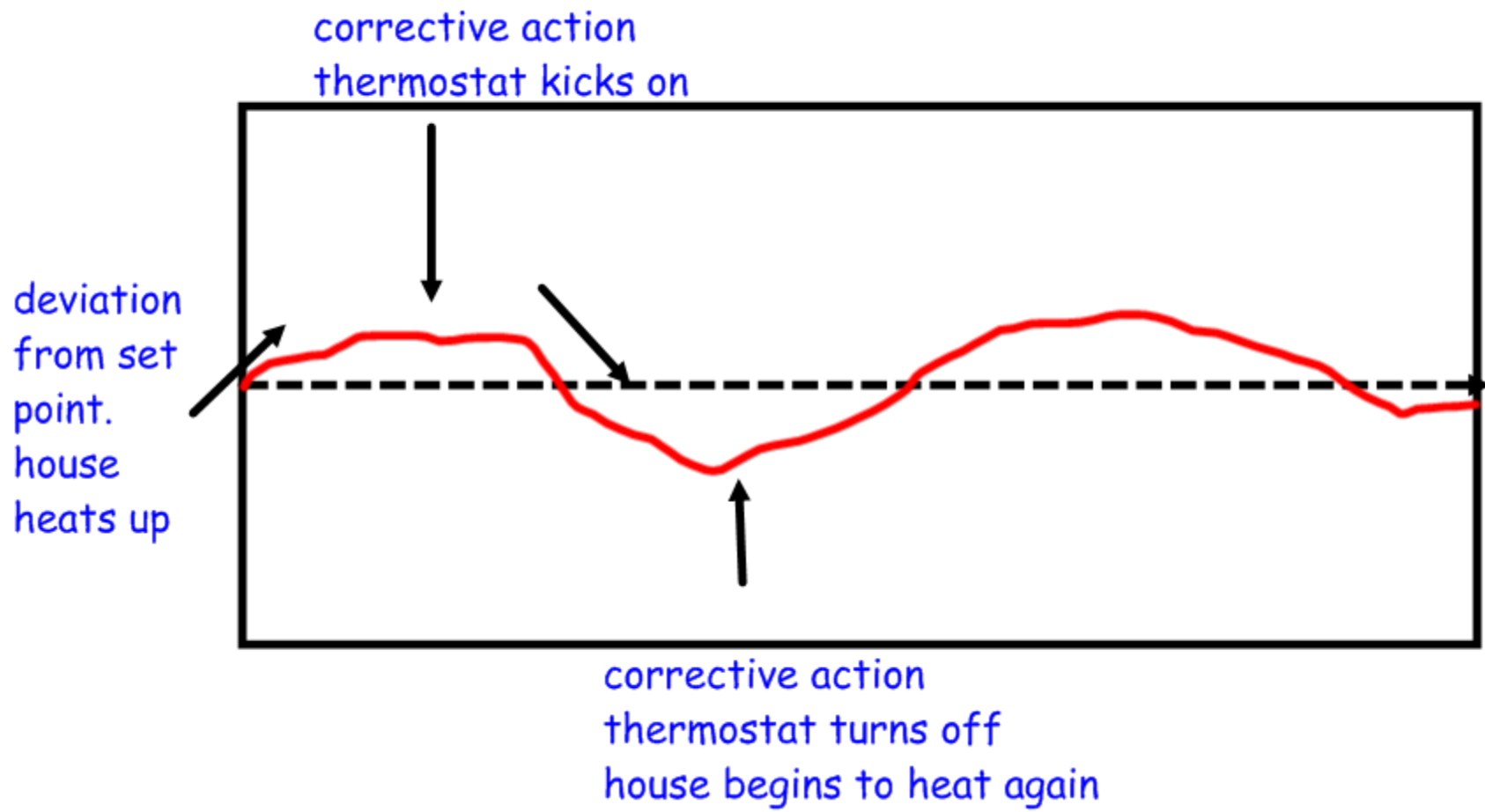
Feedback

- Systems are continually affected by information from inside and outside the system
- Feedback loops can be **negative** or **positive**
- Feedback mechanisms either change a system to a new state or return it to its original state.
- Example: you feel cold you can either put on more clothes or turn up the heater.
 - The sense of cold is the **information**
 - Putting on clothes is the **reaction**

Negative Feedback

- Works to counteract any deviation from the stable state or equilibrium
- It stabilizes a system and allows it to regulate itself and eliminates any deviation.
- Example house heating

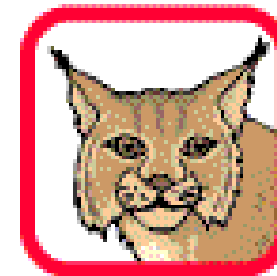
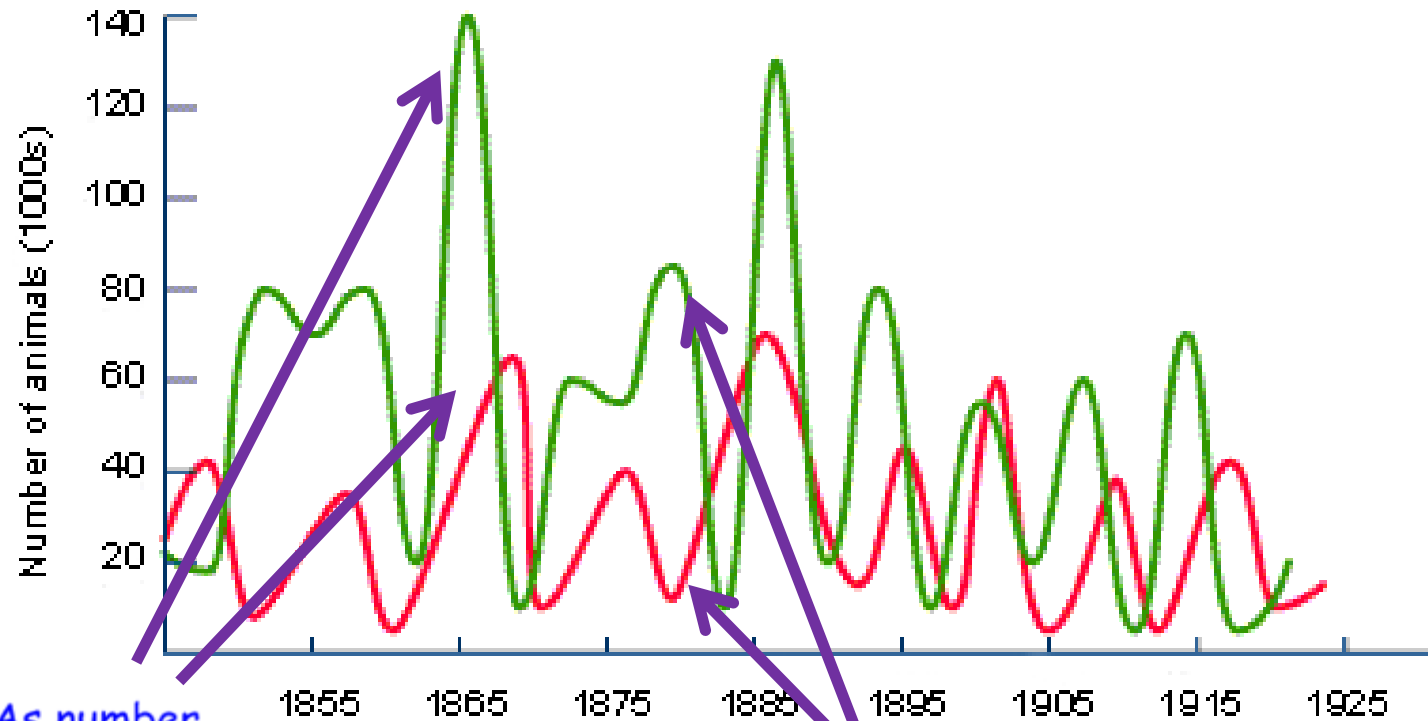




Negative Feedback

- In the human body negative feedback helps to maintain a constant body temperature
- Maintenance of a steady-state equilibrium involving negative feedback is vital to keep internal conditions animals' bodies constant.
- Also shown in Predator prey relationships. This helps balance out populations of animals

More foxes means more rabbits get eaten and they begin to decline. this effects the fox population they have less to eat and their population begins to die off.



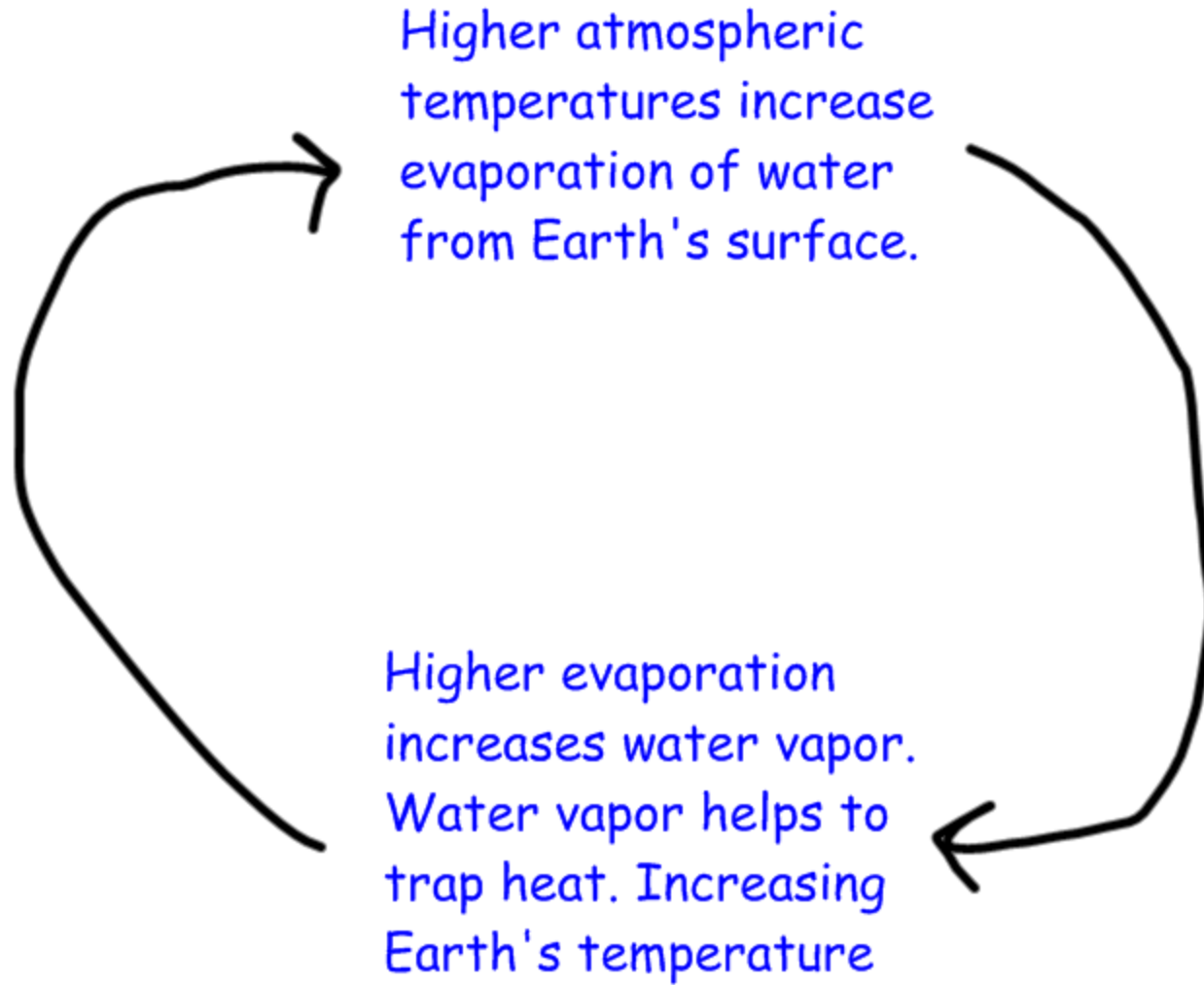
As number of rabbits increases foxes have more to eat and their population grows.

When there are less foxes around the rabbit population can begin to grow again!

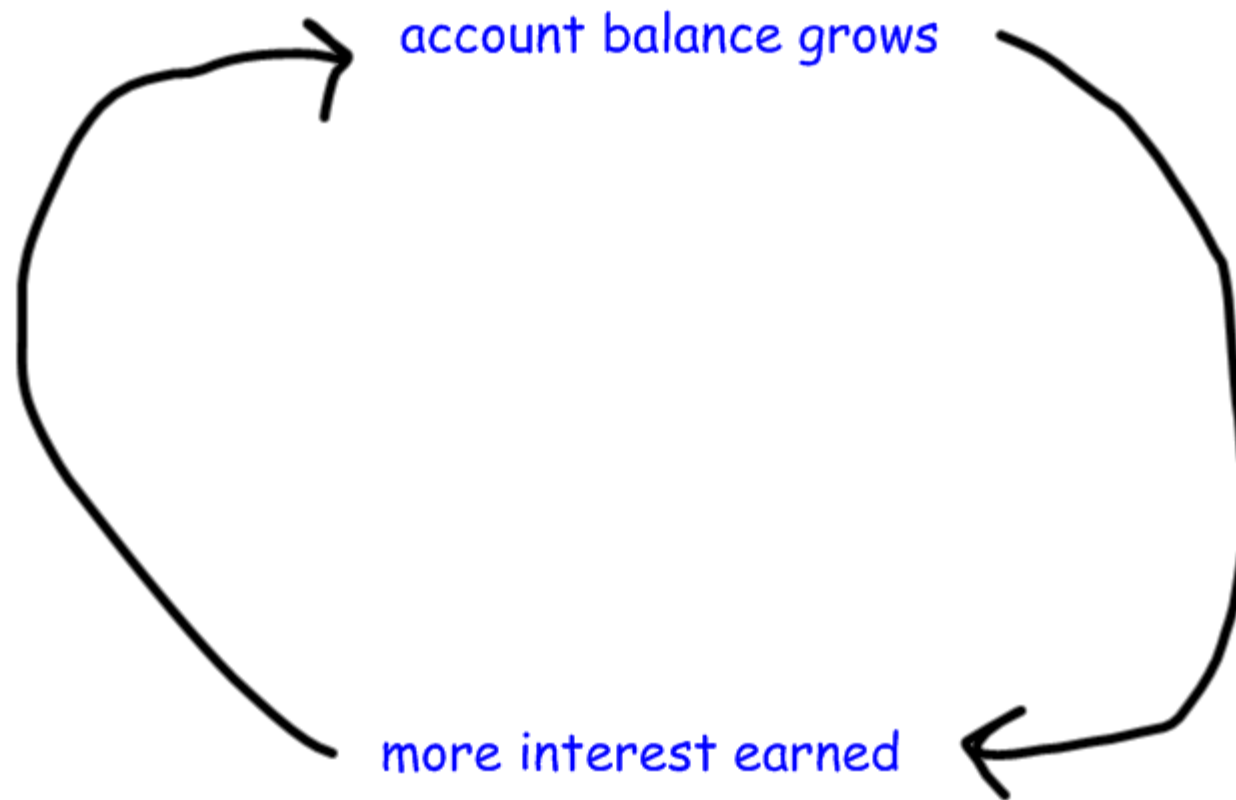
Positive Feedback

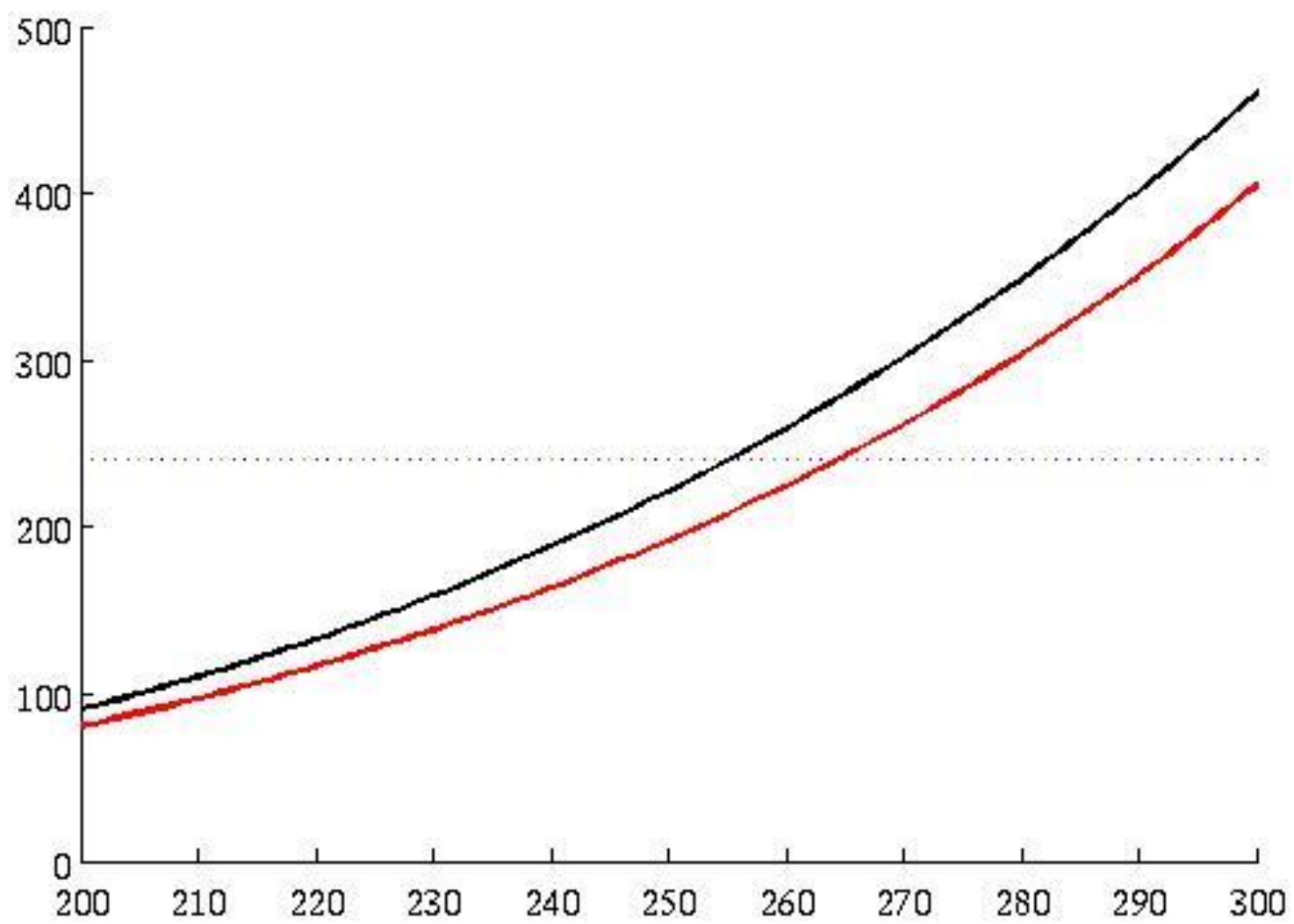
- Results in a change in the system which leads to more and greater change.
- System becomes destabilized and is pushed to a new state of equilibrium.
- Positive feedback results in a **vicious circle**
- Example: global warming

Positive Feedback



Positive Feedback

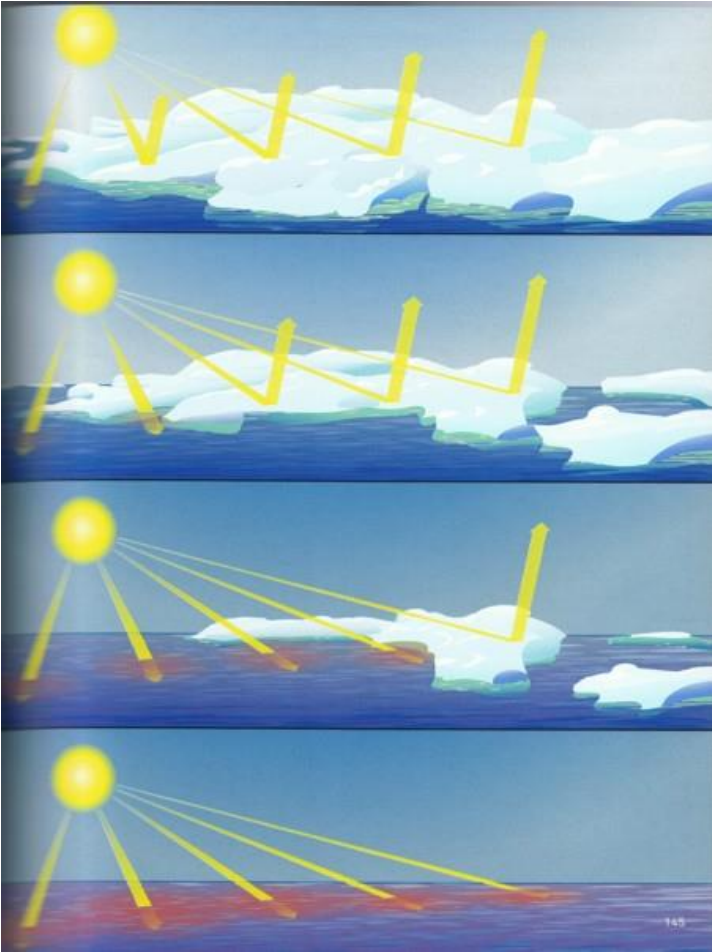




Positive & Negative

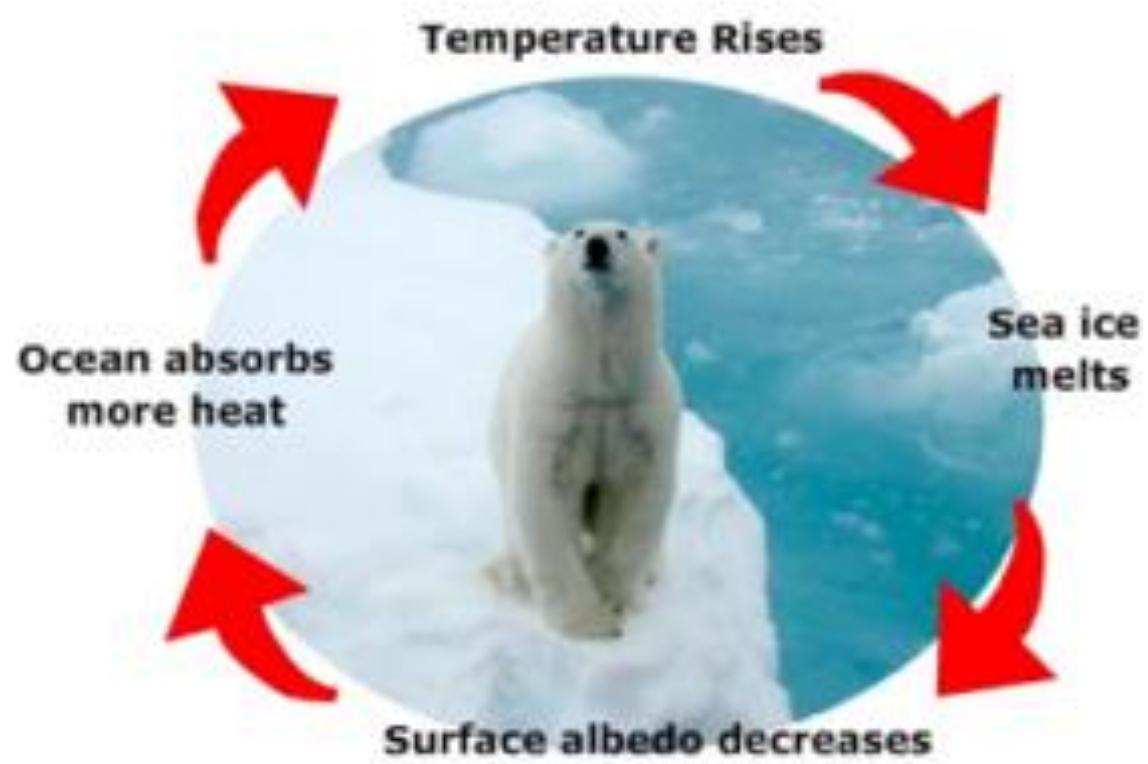
- Both natural and human systems are regulated by feedback mechanisms
- Generally we wish to preserve the environment in its present state so...
- Negative feedback is usually helpful
- Positive feedback is usually undesirable





What type of feedback is this showing?

Describe what is happening in the picture using your knowledge of equilibrium and feedback loops.



- Positive and negative feedback activity page 37
- You are about to experience a number examples of how both positive and negative feedback mechanisms might operate in the physical environment.
- For your example:
 - Label it either positive or negative feedback
 - Draw a diagram using your example
 - Include feedback loops