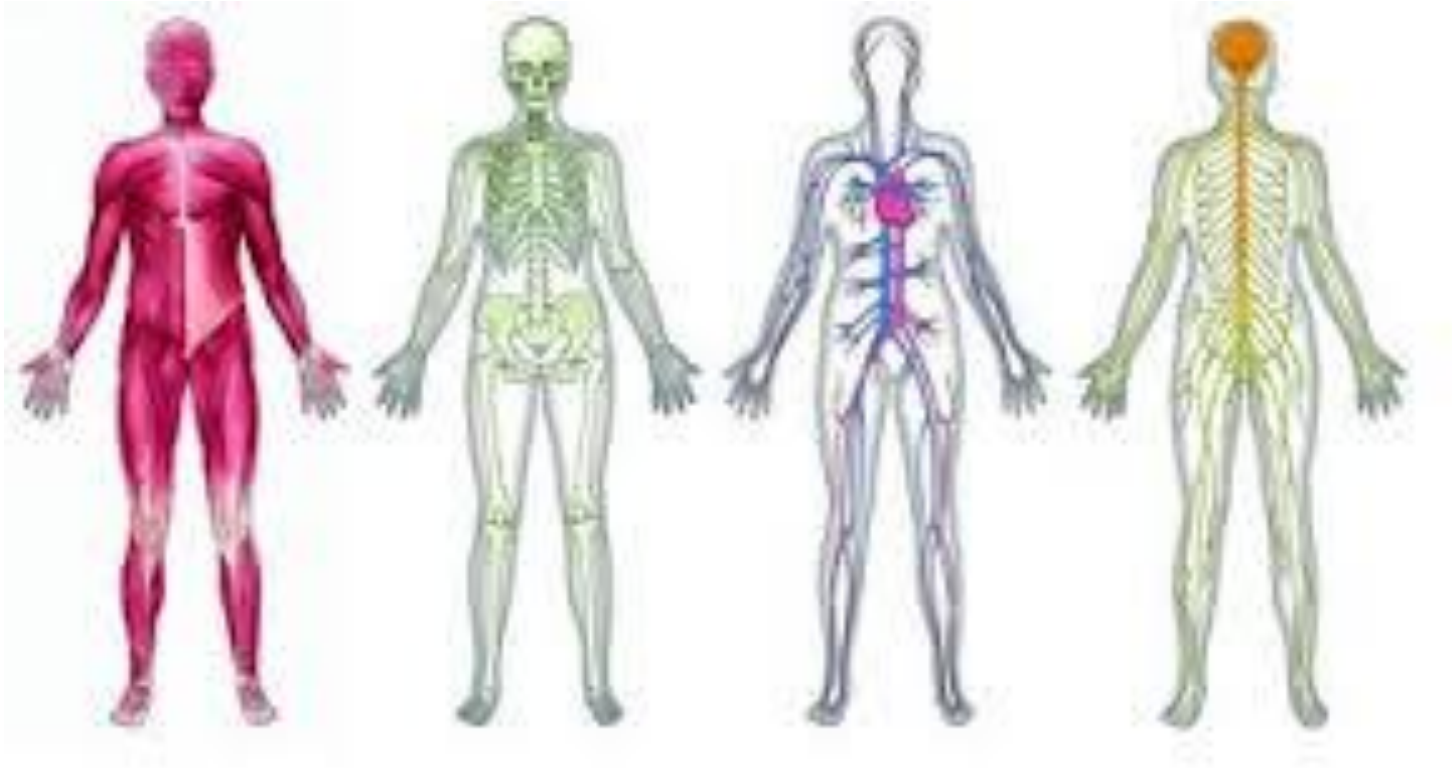
Section 8.1 - Homeostasis

SBI4U

MS. FRANKLIN

Human Body Systems

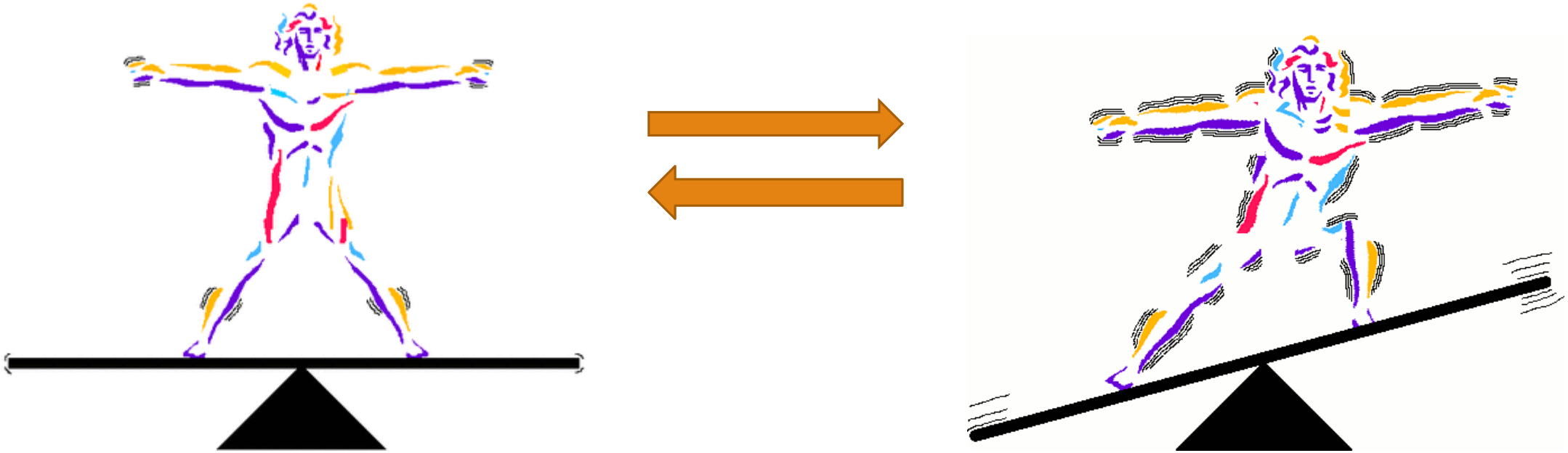
All human systems work with one another to maintain a healthy body. If one of the systems is compromised the others are also affected.



A variety of organs and systems within the human body will work together to ensure that the body is in a homeostatic state.

Homeostasis

At all times of the day, during all forms of activity, the body tries to maintain a constant temperature of 37 ^{o}C, 100 mg/mL of glucose and pH of 7.4

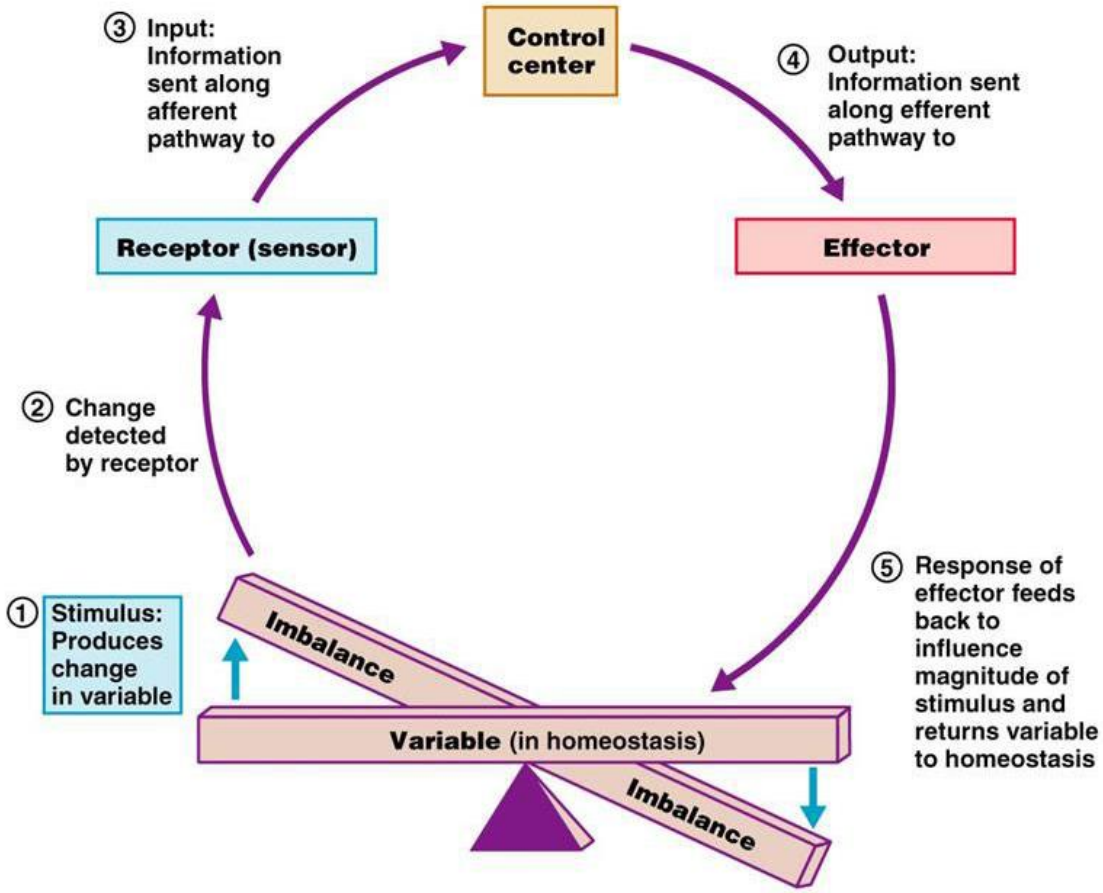


Positive vs. Negative Feedback Systems

Negative Feedback: mechanism in homeostasis whereby the output reverses the variable bringing it back to a normal state of balance.

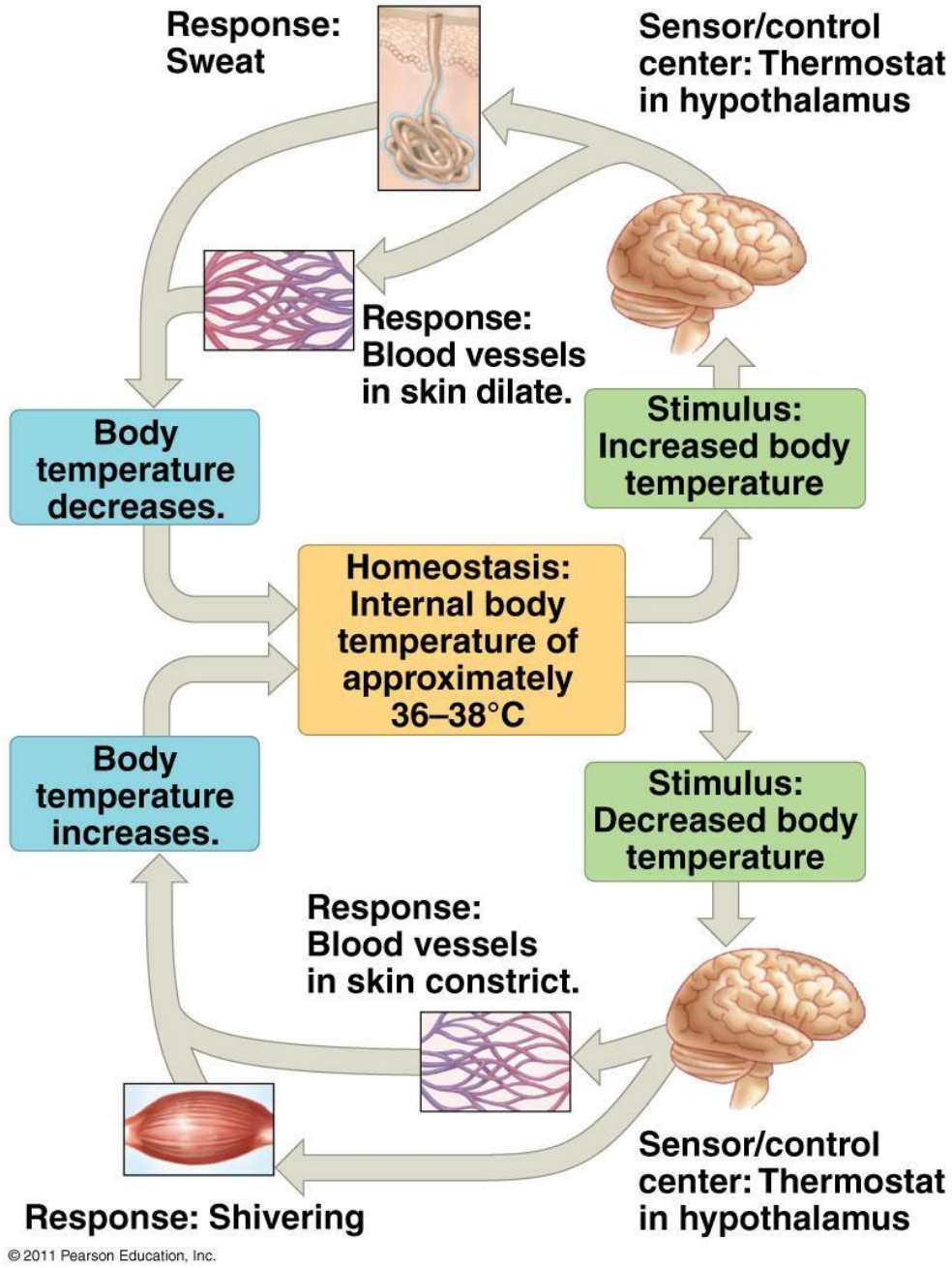
Positive Feedback: mechanism in homeostasis whereby the output strengthens and increases the change in the variable.

Negative Feedback Systems



Example of Negative Feedback Systems

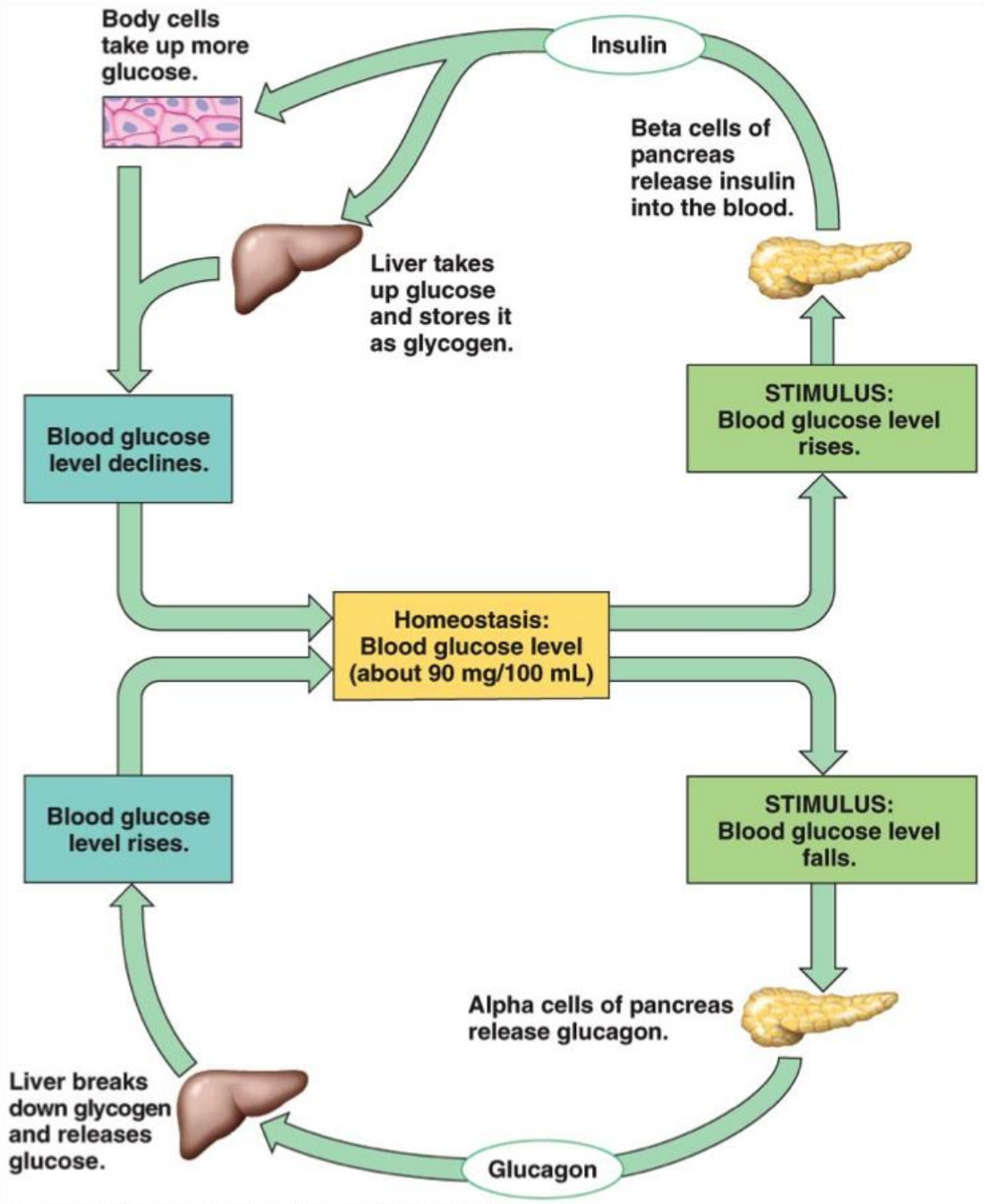
The body must maintain an internal temperature between 36-38 ° C. The hypothalamus in the brain will detect any variation in temperature by monitoring the blood and will send the appropriate signals so that the body can help bring the temperature back to a normal range.



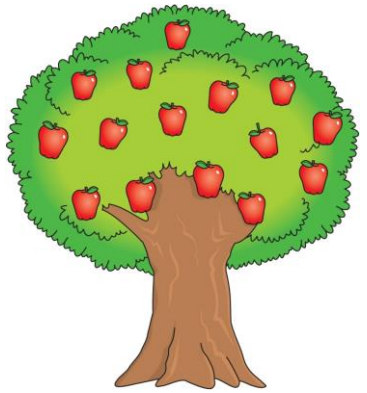
Example of Negative Feedback Systems

When the blood sugar levels spike, the beta cells in the pancreas will release insulin. Insulin is detected by cells and they begin to take up glucose and storing it as glycogen.

When the blood sugar levels drop, the alpha cells in the pancreas release glucagon which signals the cells to release glucose by breaking apart glycogen.

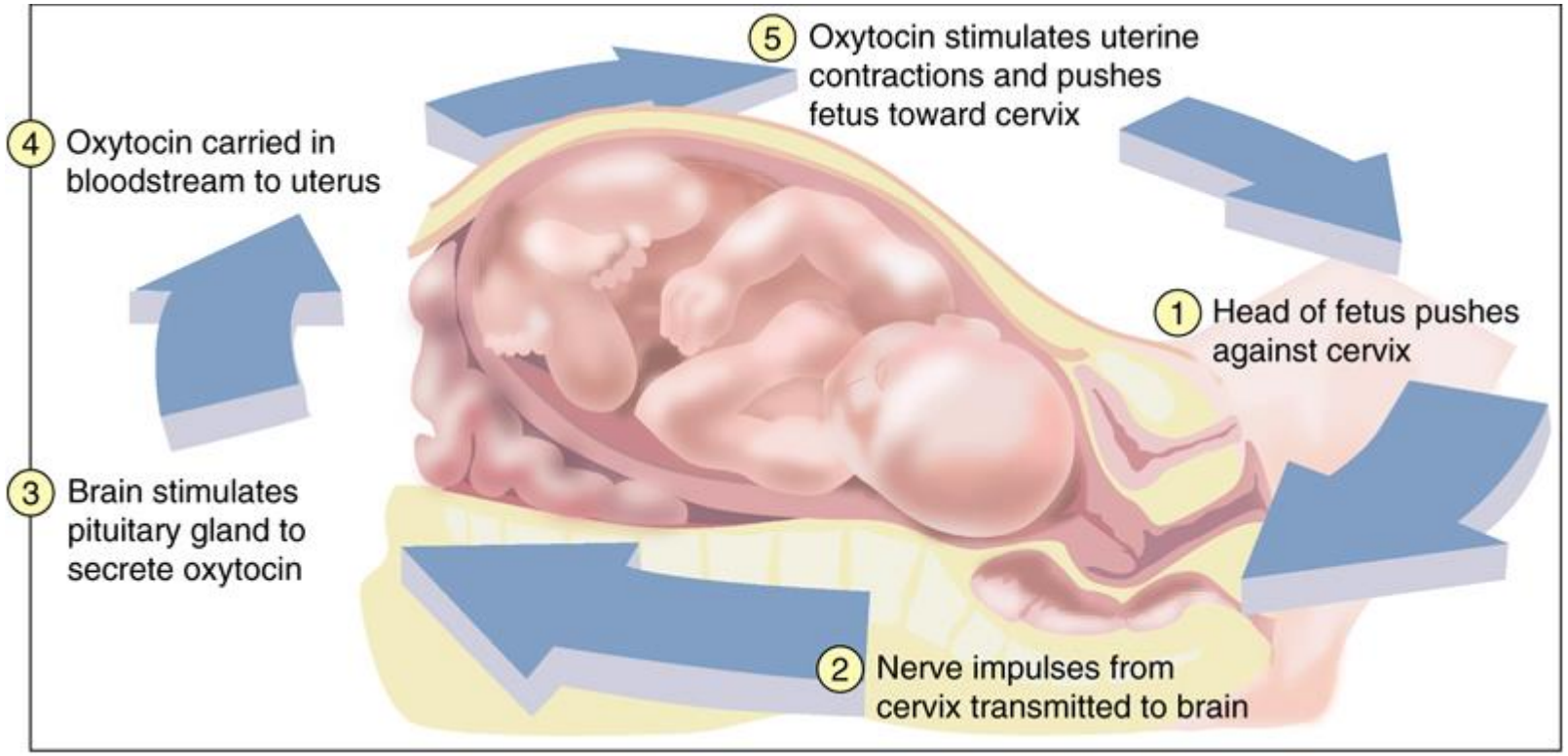


Positive Feedback Systems



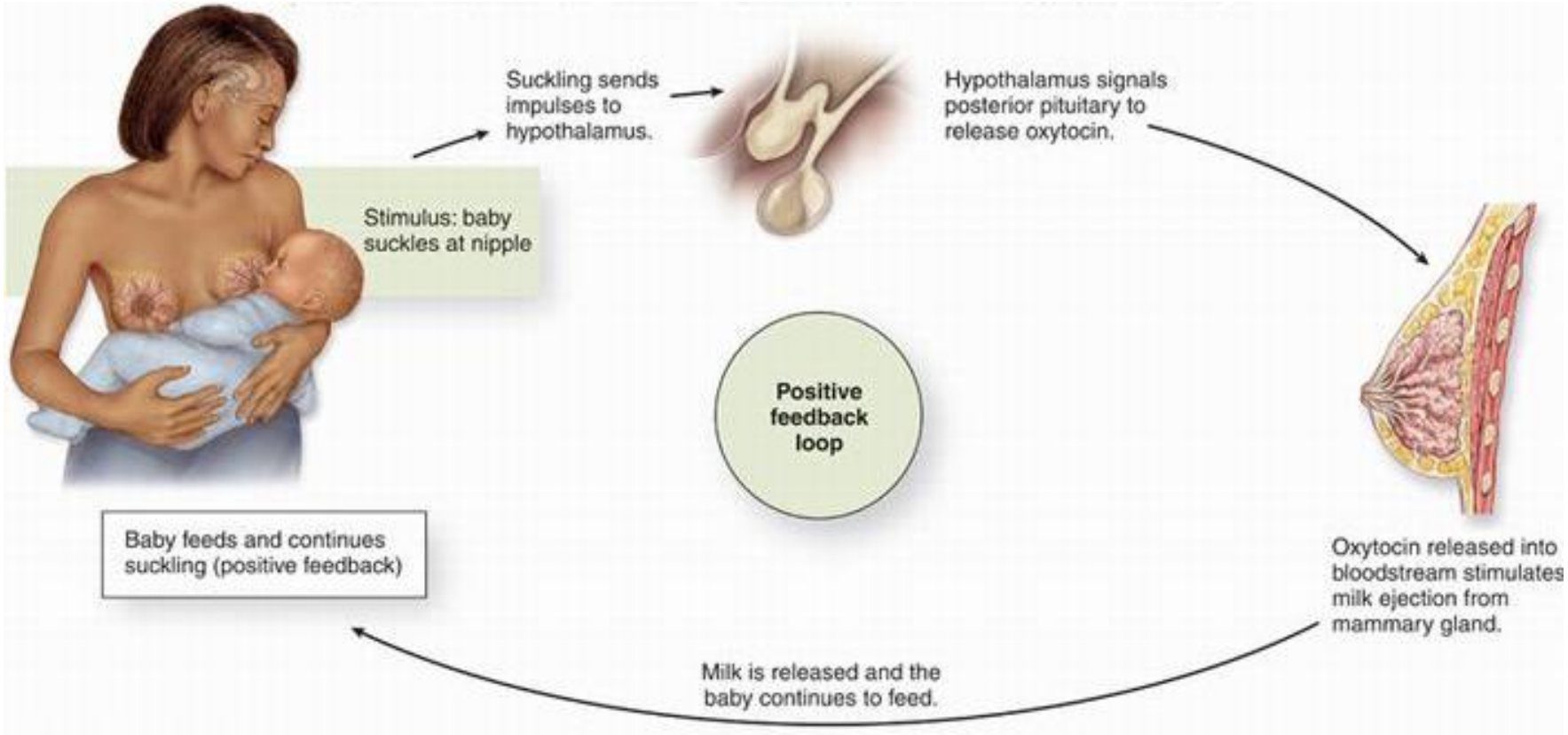
The chemical signal causes all of the other apples in the tree to ripen. Thus the change in the variable strengthens and increases the rate of change. It does not bring it back to its original state.

Examples of Positive Feedback Systems



Babies are born using a positive feedback system. The hormone oxytocin is released and strengthens the response of contraction.

Examples of Positive Feedback Systems



Oxytocin is also a hormone that is released during breastfeeding to increase the milk supply in the mother. The oxytocin strengthens the signal to ensure that the response increases overtime.

Feedback Systems

Different body systems will monitor the internal environment of the body and engage in feedback systems to maintain homeostasis in the body.

Main components of the system:

1) **Sensor:**

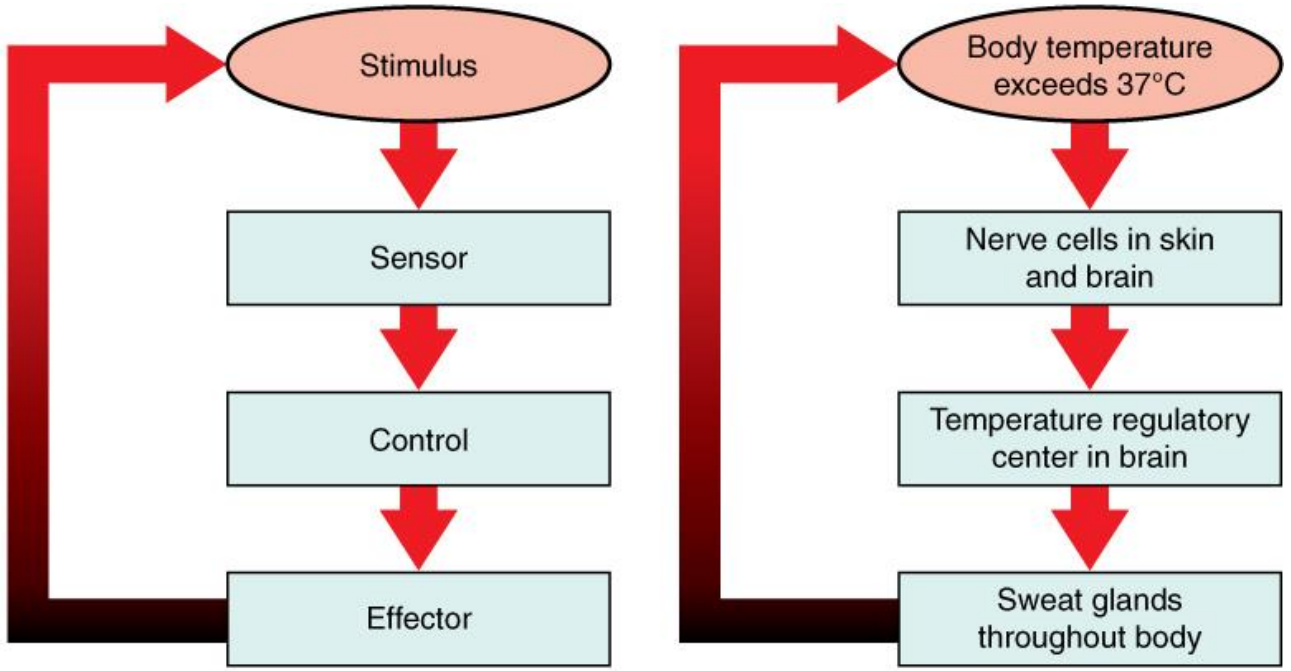
2) **Control Center:**

3) **Effector:**

Feedback Systems

*When the internal environment within the body changes, it is detected by the **sensor** (i.e brain)*

*The message is relayed to the correct area within the brain (**control center**) which then relays the signal to the appropriate **effector** (i.e organ) which can help alter the environment so that homeostasis can be maintained.*

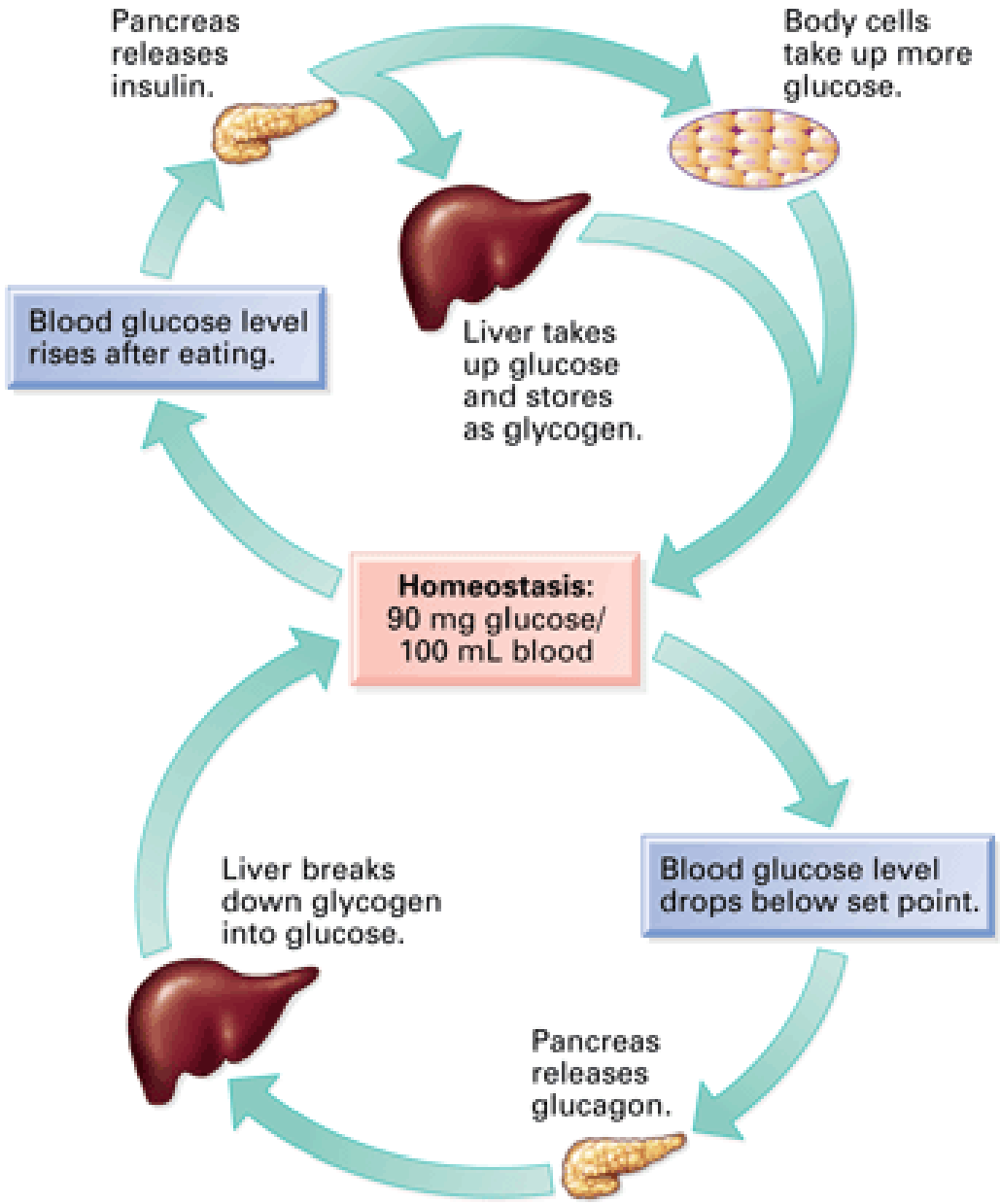


(a) Negative feedback loop

(b) Body temperature regulation

Checking for Understanding

Identify the Sensor, Control Center and the Effector for this feedback system.



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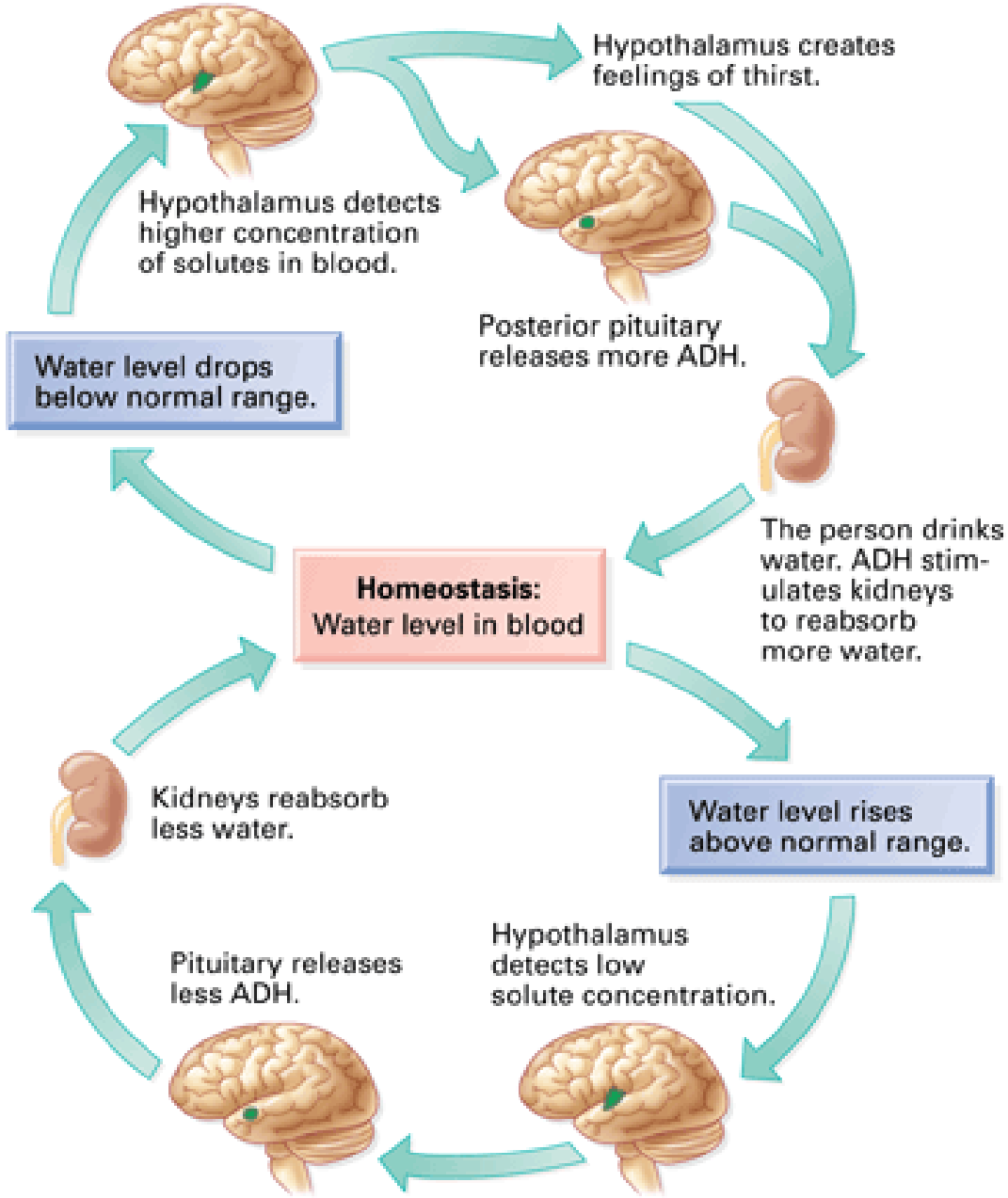

Homework

Textbook: pg. 348 # 3, 6,7,8 & 9