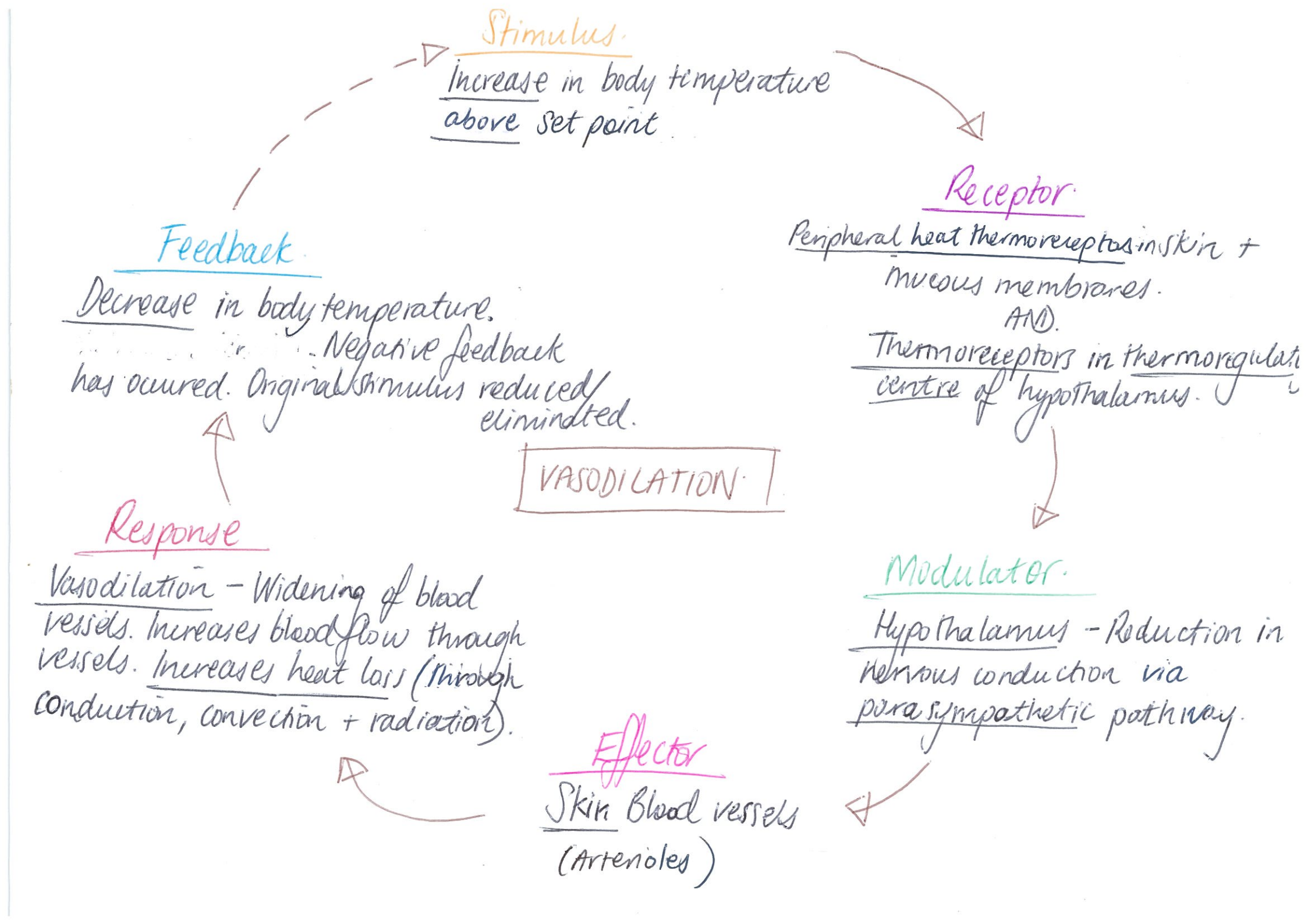
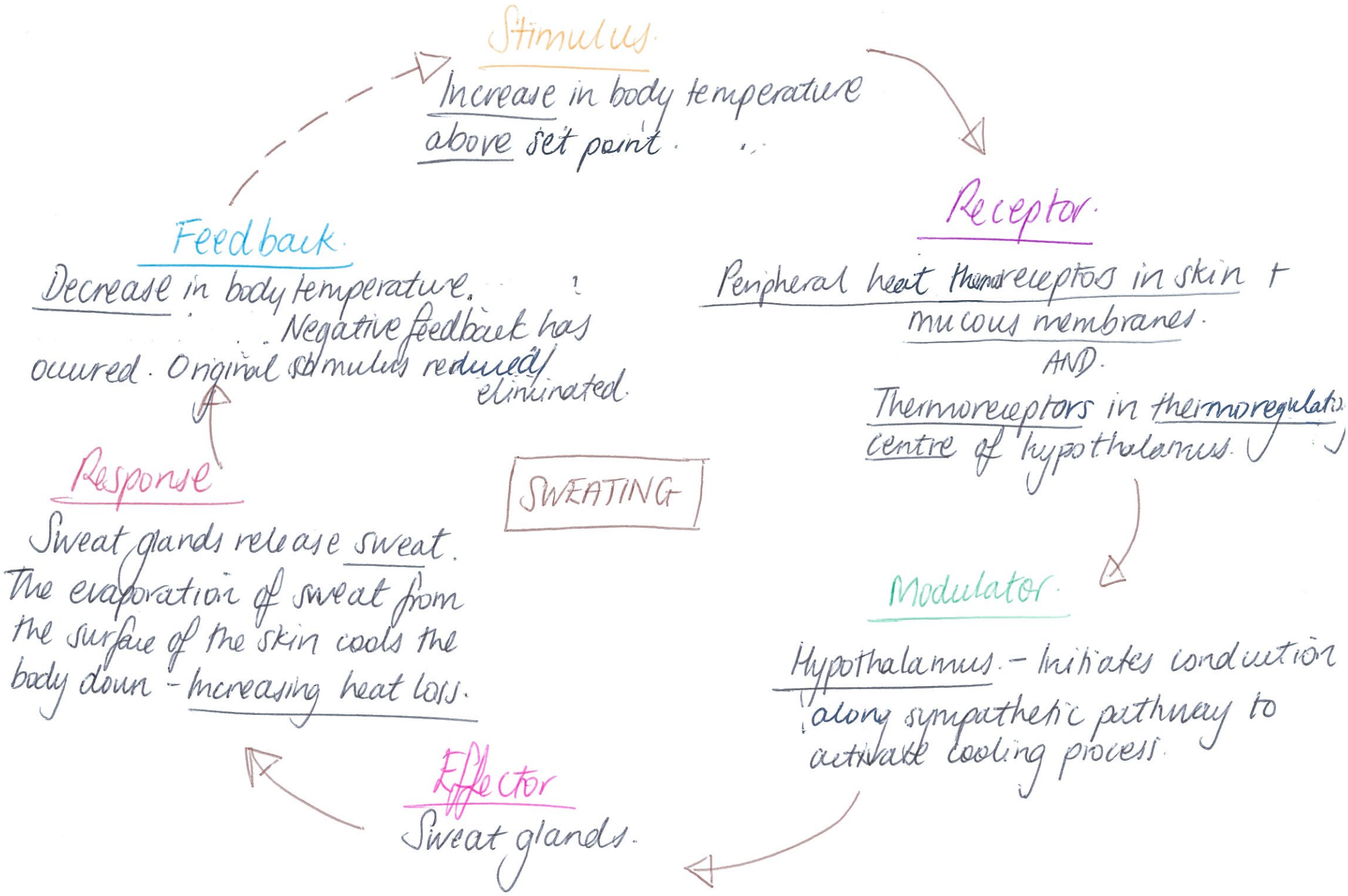
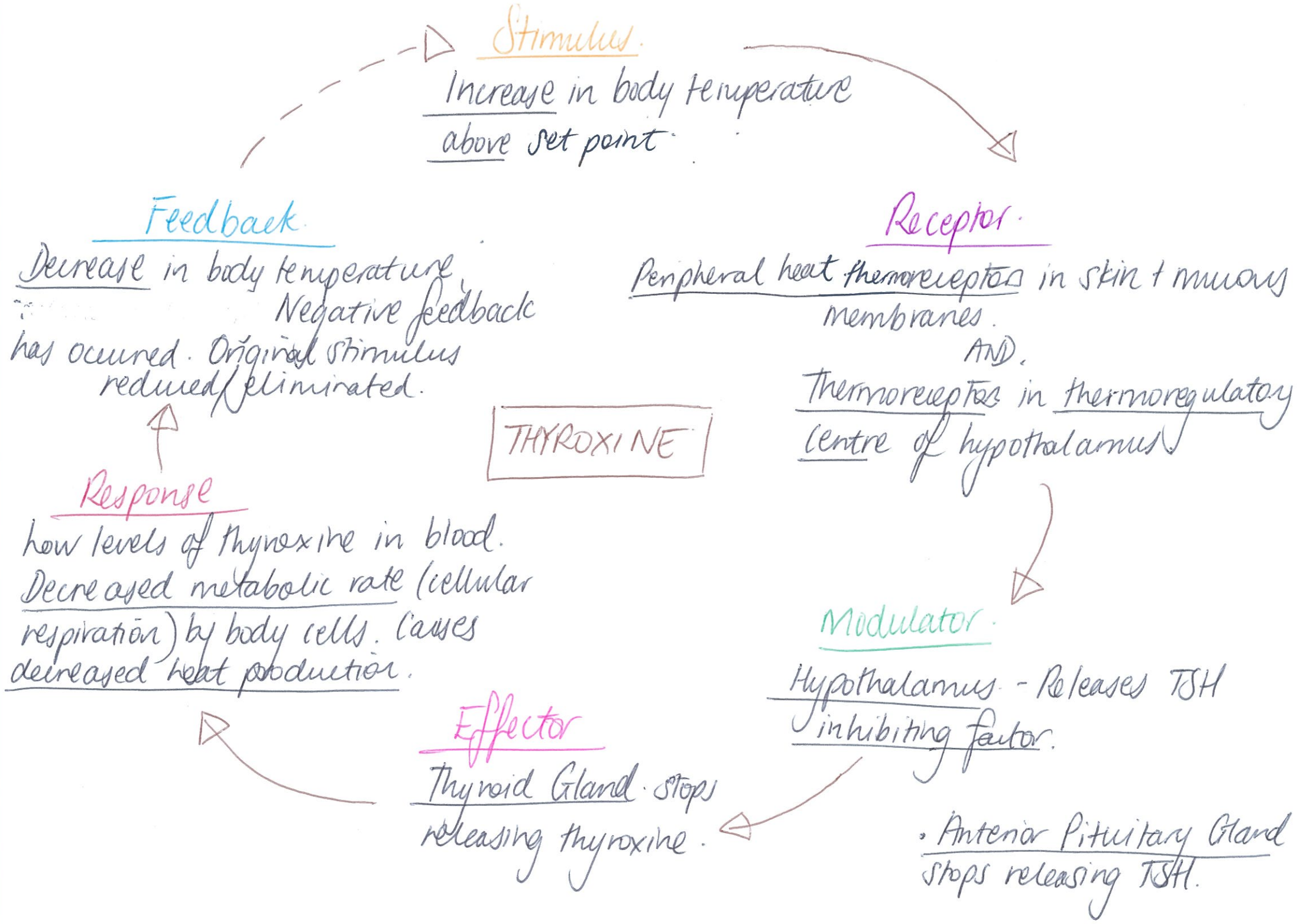

Stimulus
Increase in body temperature above set point
Receptor
Peripheral heat thermoreceptors in skin + mucous membranes.
AND
Thermoreceptors in thermoregulat centre of hypothalamus.
Modulator
Hypothalamus - Reduction in nervous conduction via parasympathetic pathway.
Effector
Skin Blood vessels (Arterioles)
Response
Vasodilation - Widening of blood vessels. Increases blood flow through vessels. Increases heat loss (through conduction, convection + radiation).
Feedback
Decrease in body temperature. Negative feedback has occured. Original stimulus reduced/ eliminated.
VASODILATION


Stimulus.
Increase in body temperature above set point.
Receptor.
Peripheral heat thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in thermoregulatory centre of hypothalamus.
Modulator.
Hypothalamus. - initiates conduction along sympathetic pathway to activate cooling process.
Effector
Sweat glands.
Response
Sweat glands release sweat. The evaporation of sweat from the surface of the skin cools the body down - increasing heat loss.
Feedback.
Decrease in body temperature. Negative feedback has occured. Original stimulus reduced/eliminated.
SWEATING


Stimulus.
Increase in body temperature above set point.
Receptor.
Peripheral heat thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in thermoregulatory centre of hypothalamus
Modulator.
Hypothalamus - Releases TSH inhibiting factor.
• Anterior Pituitary Gland stops releasing TSH.
Effector
Thyroid Gland stops releasing thyroxine.
Response
low levels of thyroxine in blood.
Decreased metabolic rate (cellular respiration) by body cells. Causes decreased heat production.
Feedback
Decrease in body temperature.
Negative feedback has occured. Original stimulus reduced/eliminated.
THYROXINE

Stimulus.

Increase in body temperature above set point.

Receptor.

Peripheral heat thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in thermoregulatory centre of hypothalamus.

Modulator.

Hypothalamus - initiates nervous conduction to activate cooling processes.

Effector

Cerebrum -

Messages received here stimulate behavioural response in skeletal muscles.

Response

Conscious decision to:
1. Take more clothes off.
2. Turn on aircon/fan.
3. Increase body surface area by spreading out.
4. Reduce physical activity.
5. Stand in shade.

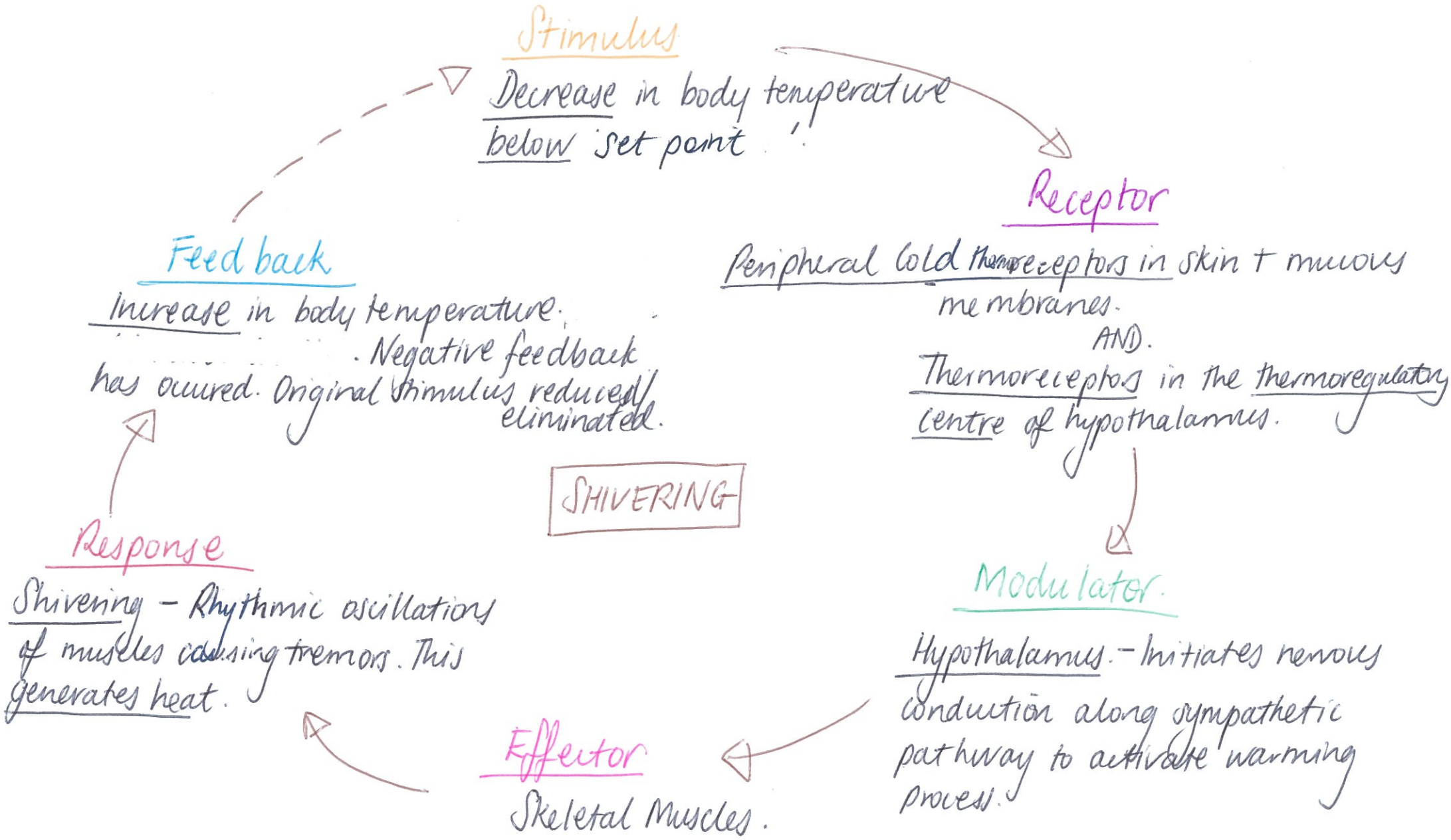
All of these increase heat loss or decrease heat production.

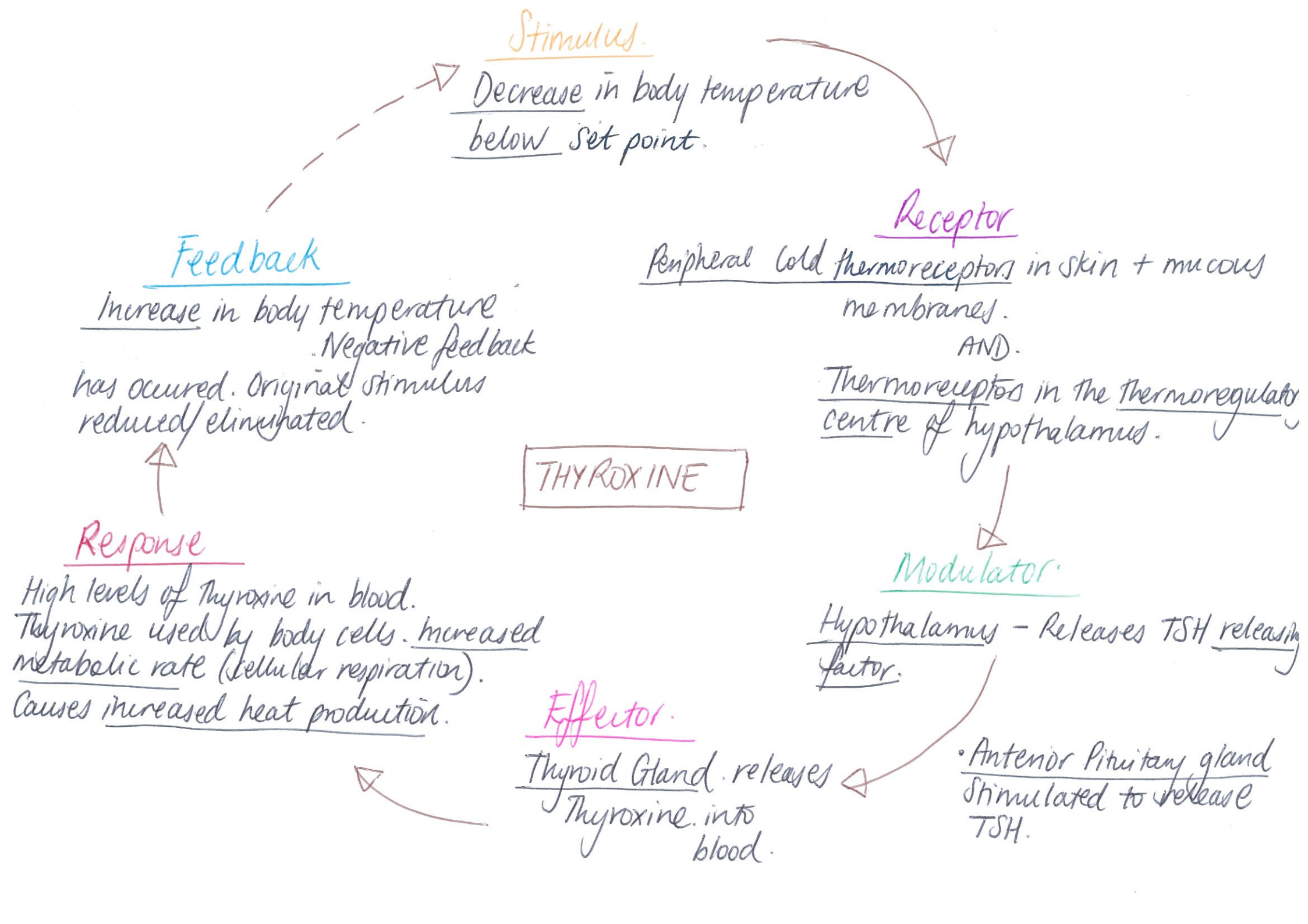
By convection, conduction + radiation. (Must be specific how each method increases heat loss).

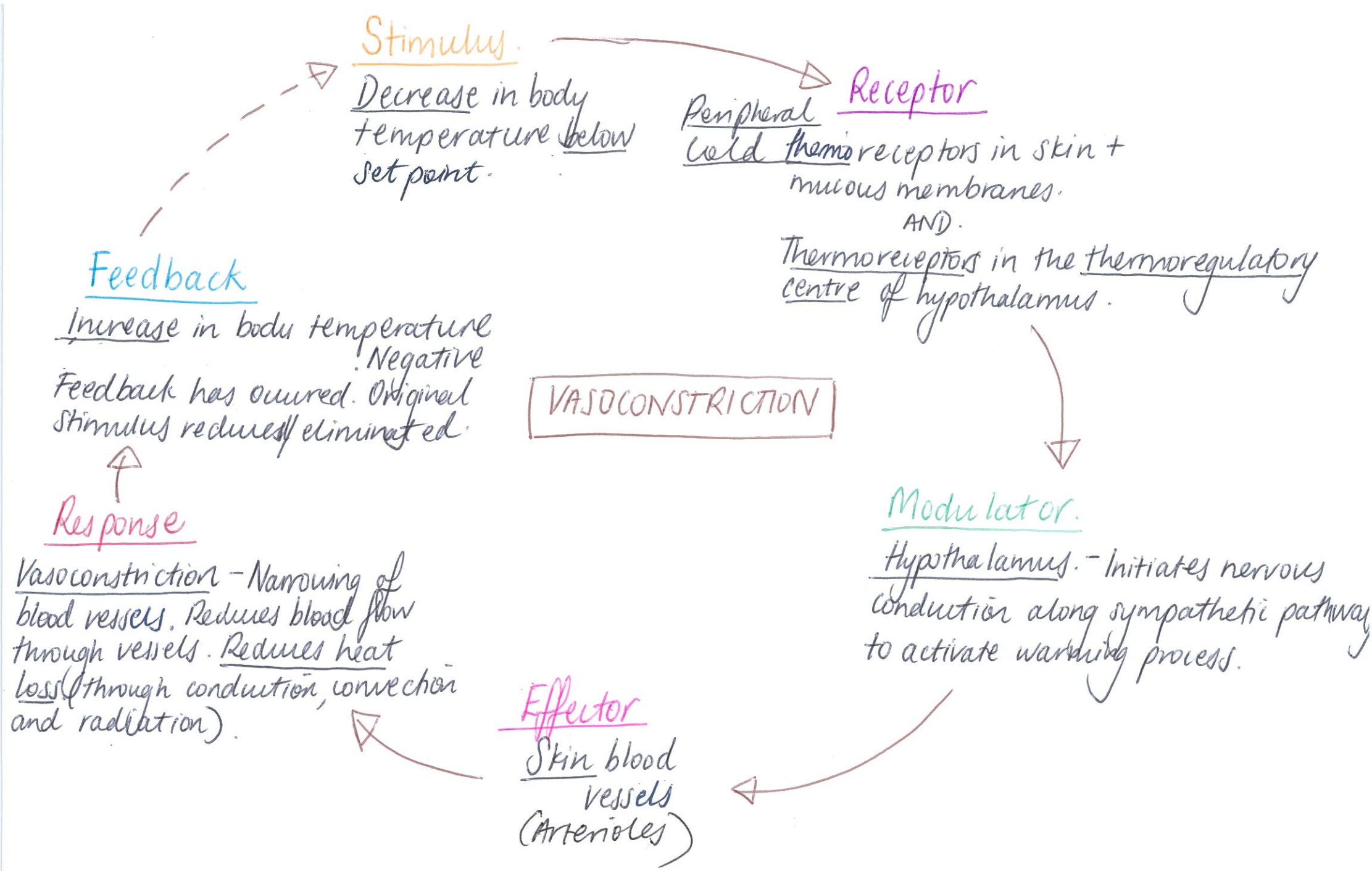
Feedback.

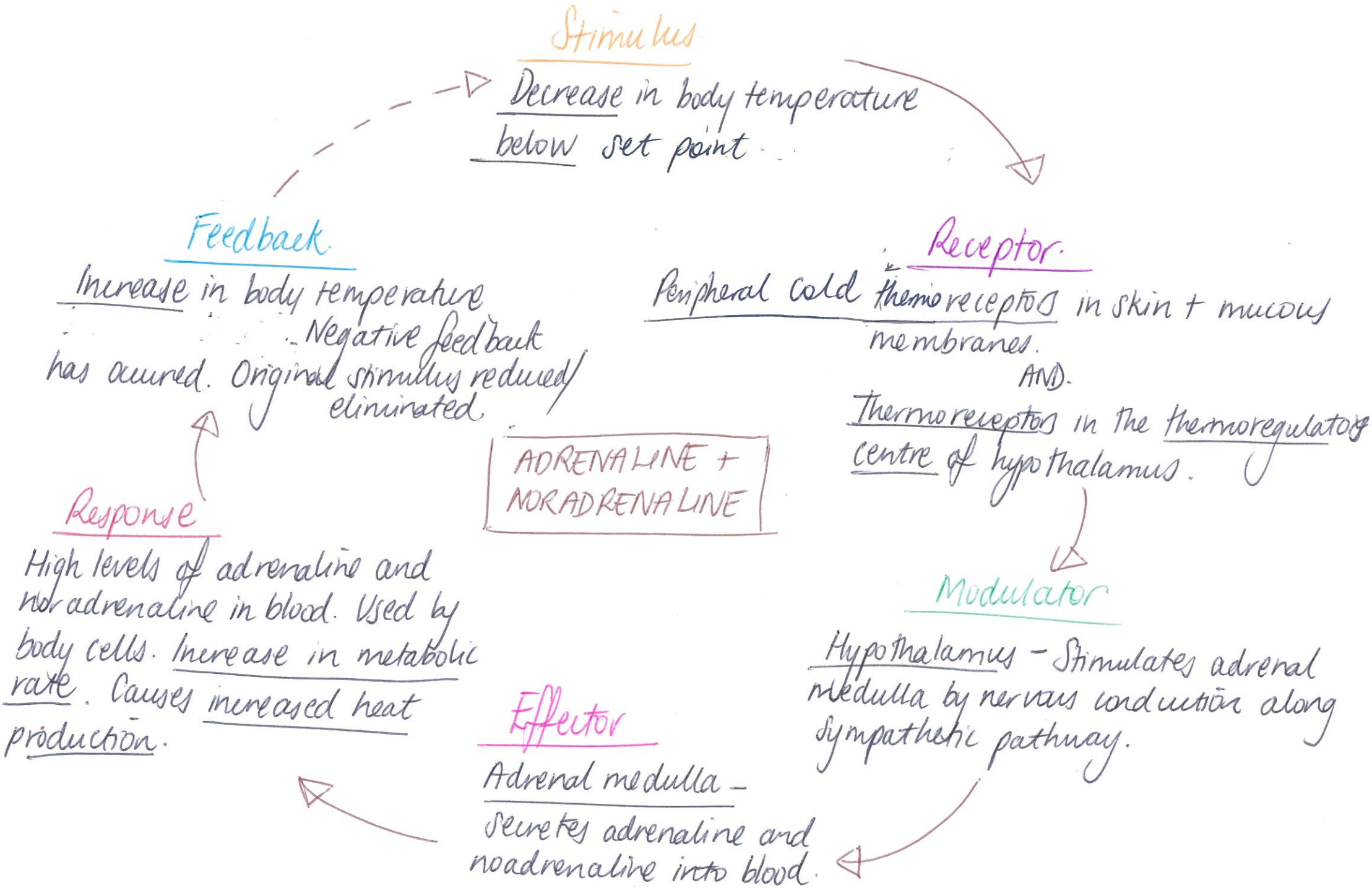
Decrease in body temperature.
- Negative feedback has occured. Original stimulus reduced/eliminated.

BEHAVIOUR


Stimulus
Decrease in body temperature below set point
Receptor
Peripheral cold thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in the thermoregulatory centre of hypothalamus.
Modulater.
Hypothalamus. - Initiates nervous conduction along sympathetic pathway to activate warming process.
Effector
Skeletal Muscles.
Response
Shivering - Rhythmic oscillations of muscles causing tremors. This generates heat.
Feed back
Increase in body temperature. Negative feedback has occured. Original stimulus reduced/ eliminated.
SHIVERING


Stimulus.
Decrease in body temperature below set point.
Receptor
Peripheral cold thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in the thermoregulatory centre of hypothalamus.
Modulator.
Hypothalamus - Releases TSH releasing factor.
• Anterior Pituitary gland stimulated to release TSH.
Effector.
Thyroid Gland releases Thyroxine into blood.
Response
High levels of Thyroxine in blood.
Thyroxine used by body cells. Increased metabolic rate (cellular respiration).
Causes increased heat production.
Feedback
Increase in body temperature.
Negative feedback has occured. Original stimulus reduced/eliminated.
THYROXINE


Stimulus.
Decrease in body temperature below set point.
Receptor
Peripheral cold thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in the thermoregulatory centre of hypothalamus.
Modulator.
Hypothalamus. - Initiates nervous conduction along sympathetic pathway to activate warming process.
Effector
Skin blood vessels (Arterioles)
VASOCONSTRICTION
Response
Vasoconstriction - Narrowing of blood vessels. Reduces blood flow through vessels. Reduces heat loss (through conduction, convection and radiation).
Feedback
Increase in body temperature ! Negative Feedback has occured. Original stimulus reduces/ eliminated.


Stimulus
Decrease in body temperature below set point
Receptor
Peripheral cold thermoreceptors in skin + mucous membranes.
AND.
Thermoreceptors in the thermoregulatory centre of hypothalamus.
Modulator
Hypothalamus - Stimulates adrenal medulla by nervous conduction along sympathetic pathway.
Effector
Adrenal medulla -
Secretes adrenaline and noradrenaline into blood.
ADRENALINE + NORADRENALINE
Response
High levels of adrenaline and noradrenaline in blood. Used by body cells. Increase in metabolic rate. Causes increased heat production.
Feedback
Increase in body temperature
Negative feedback has occured. Original stimulus reduced/ eliminated

Stimulus

Decrease in body temperature below set point.

Receptor

Peripheral Cold thermoreceptors in skin + mucous membranes.

AND.

Thermoreceptors in the thermoregulatory centre of hypothalamus.

Modulator

Hypothalamus - Initiates nervous conduction to activate warming processes.

Effector

Cerebrum - Messages received here to stimulate behavioural response in skeletal muscle.

Response

Conscious decision to:

1. Put more clothes on
2. Turn on a heater.
3. Decrease body surface area by curling up.
4. Increase physical activity

All of these reduce heat loss or increase heat production.

By conduction, convection + radiation. (Must specify how each method reduces heat loss).

Feedback

Increase in body temperature.

! Negative feedback has occured. Original stimulus reduced/eliminated.

BEHAVIOUR

Stimulus.

Osmotic pressure increases.
Water conc. in blood decreases.
Decreased flow of saliva (Dry mouth)

Receptor.

Osmoreceptors in hypothalamus.
ANH).
Receptors in mouth.

Modulator.

Thirst centre of hypothalamus.
Stimulated.

Effector.

Cerebrum / Cerebral cortex.
activates drinking behaviour =
conscious decision to have a
drink.

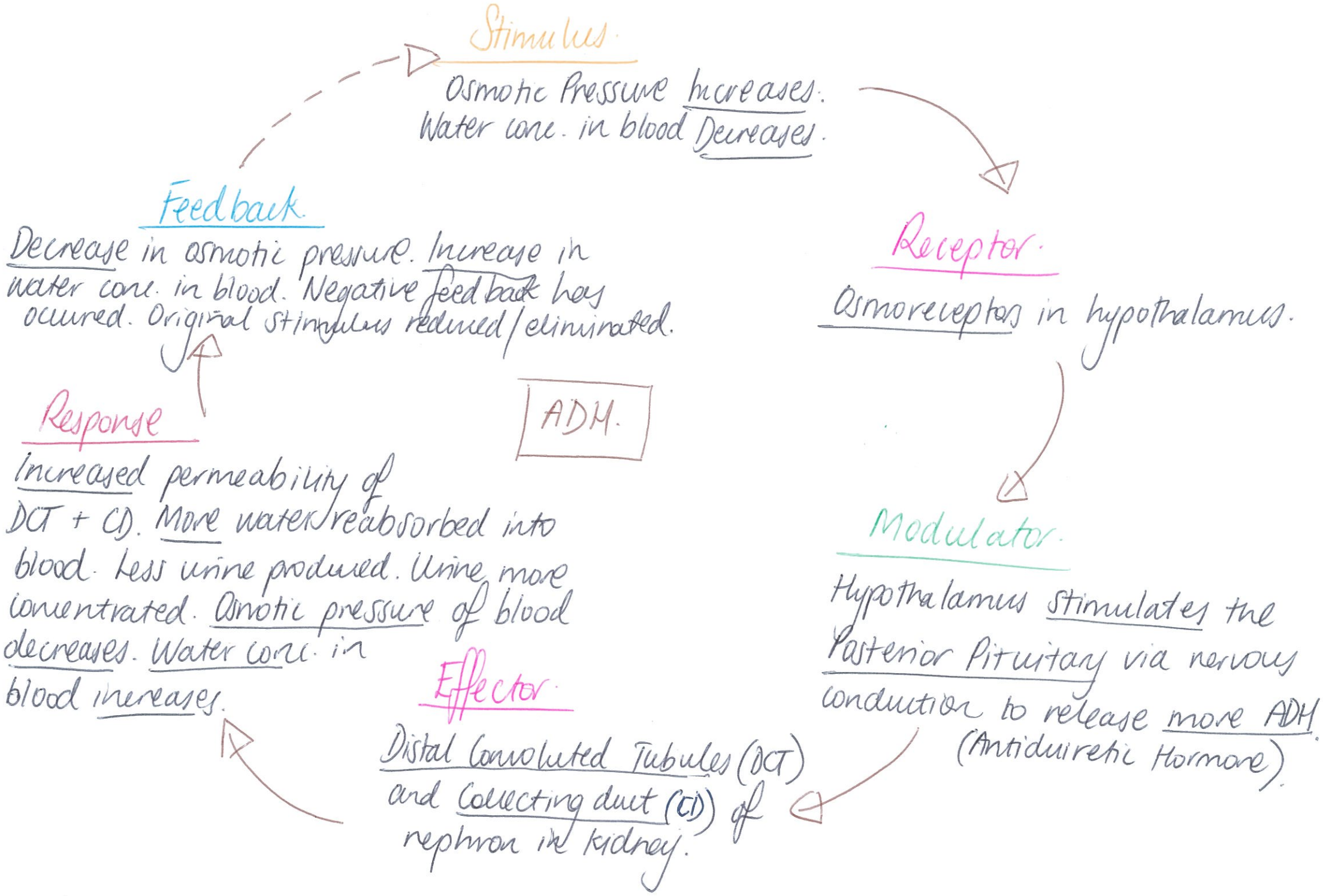
Response

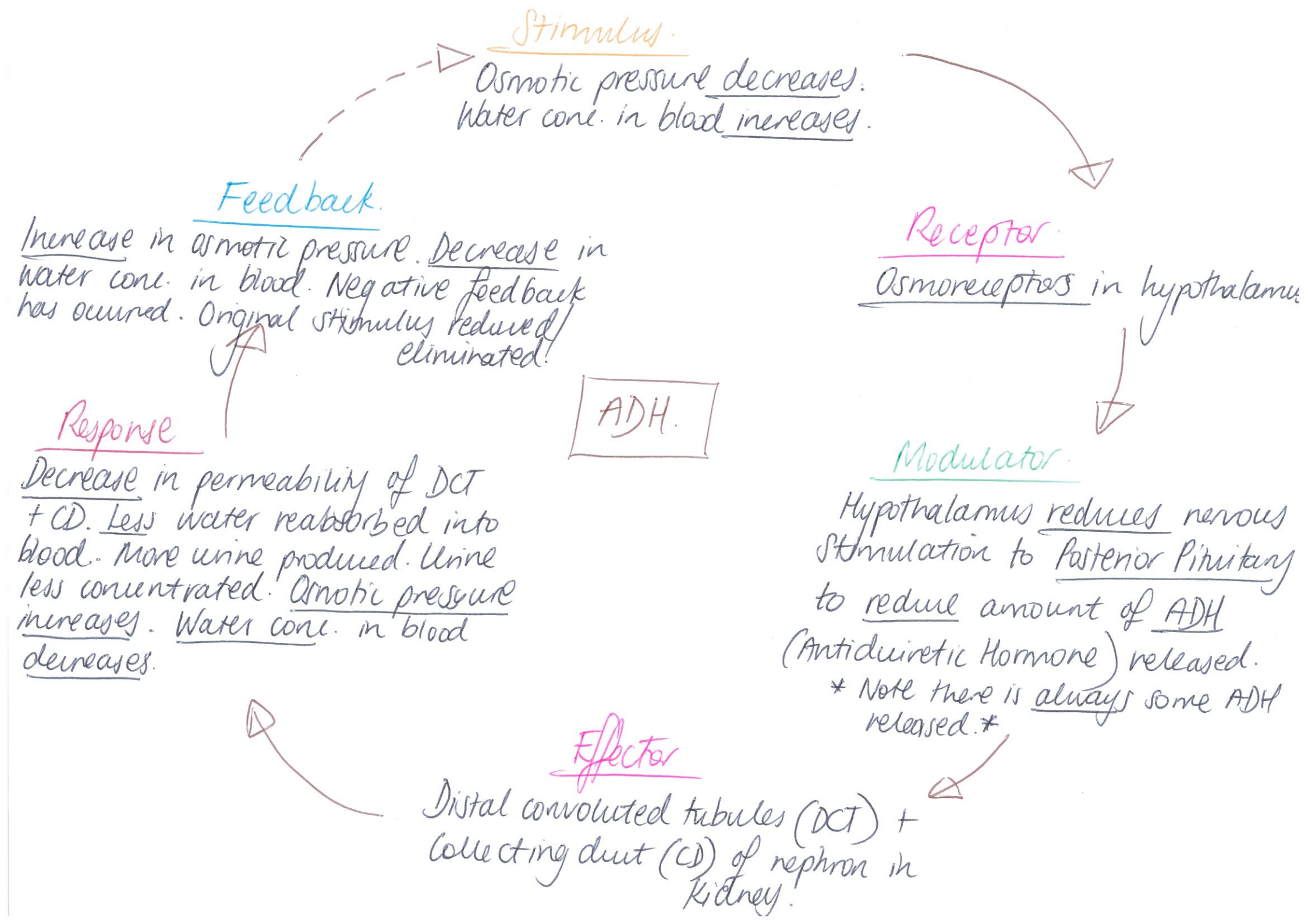
Person has a drink. Water is absorbed into bloodstream from colon (alimentary canal).
Water concentration in blood increases. Osmotic pressure decreases.

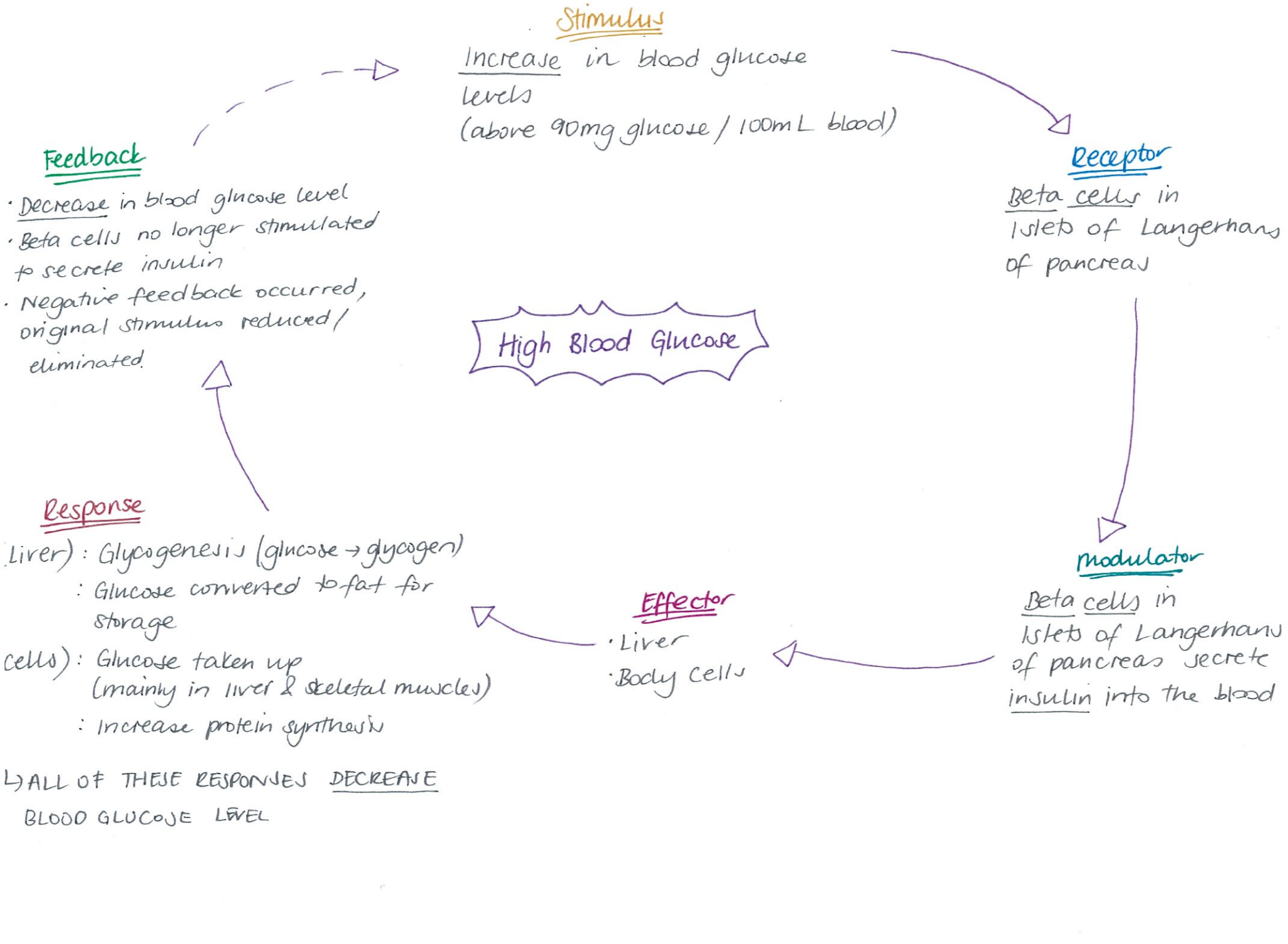
THIRST

Feedback.

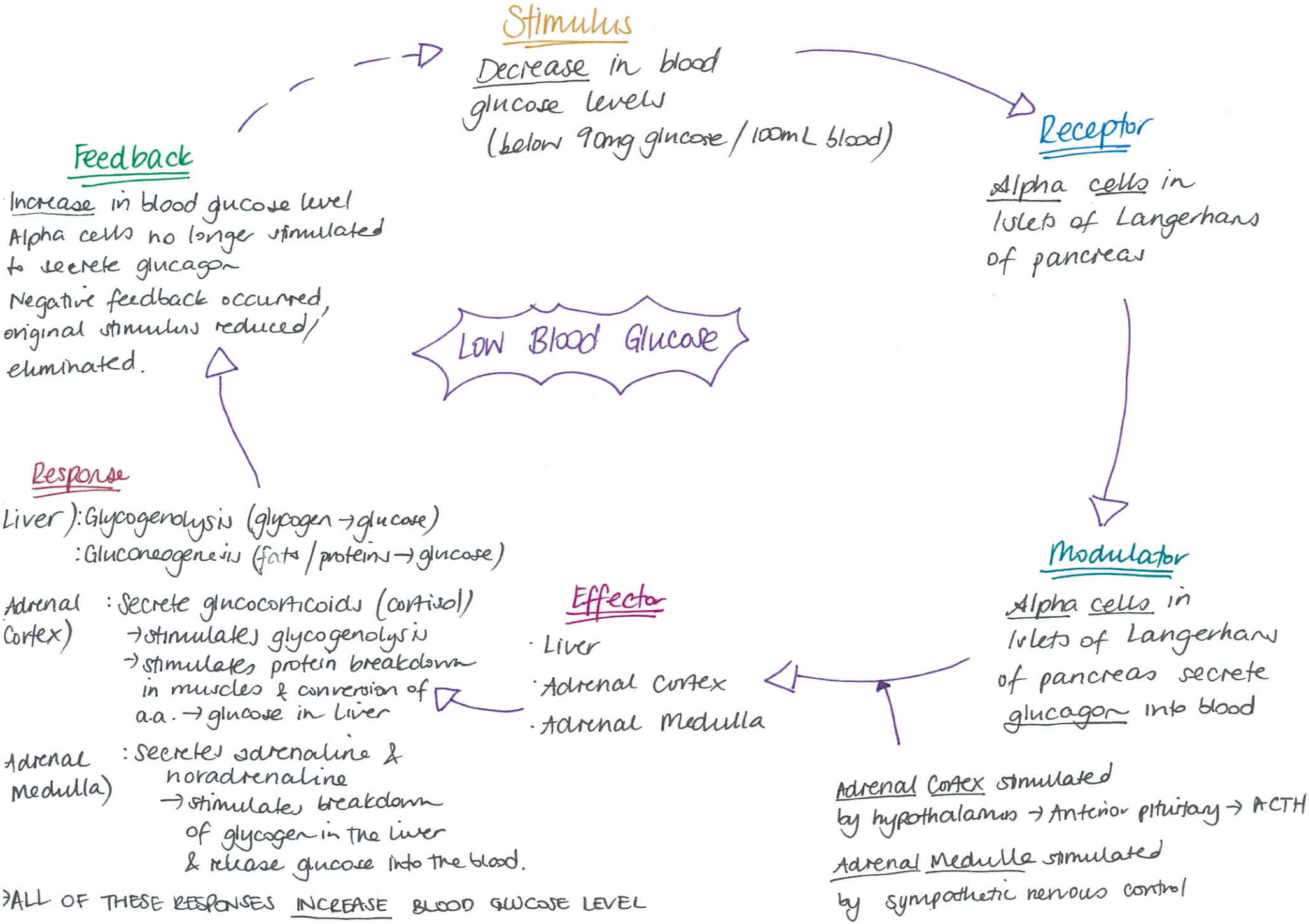
Osmotic pressure decreases. Water conc. in blood increases. Sensation of thirst ceases. Negative feedback has occured. Original stimulus reduced/ eliminated.

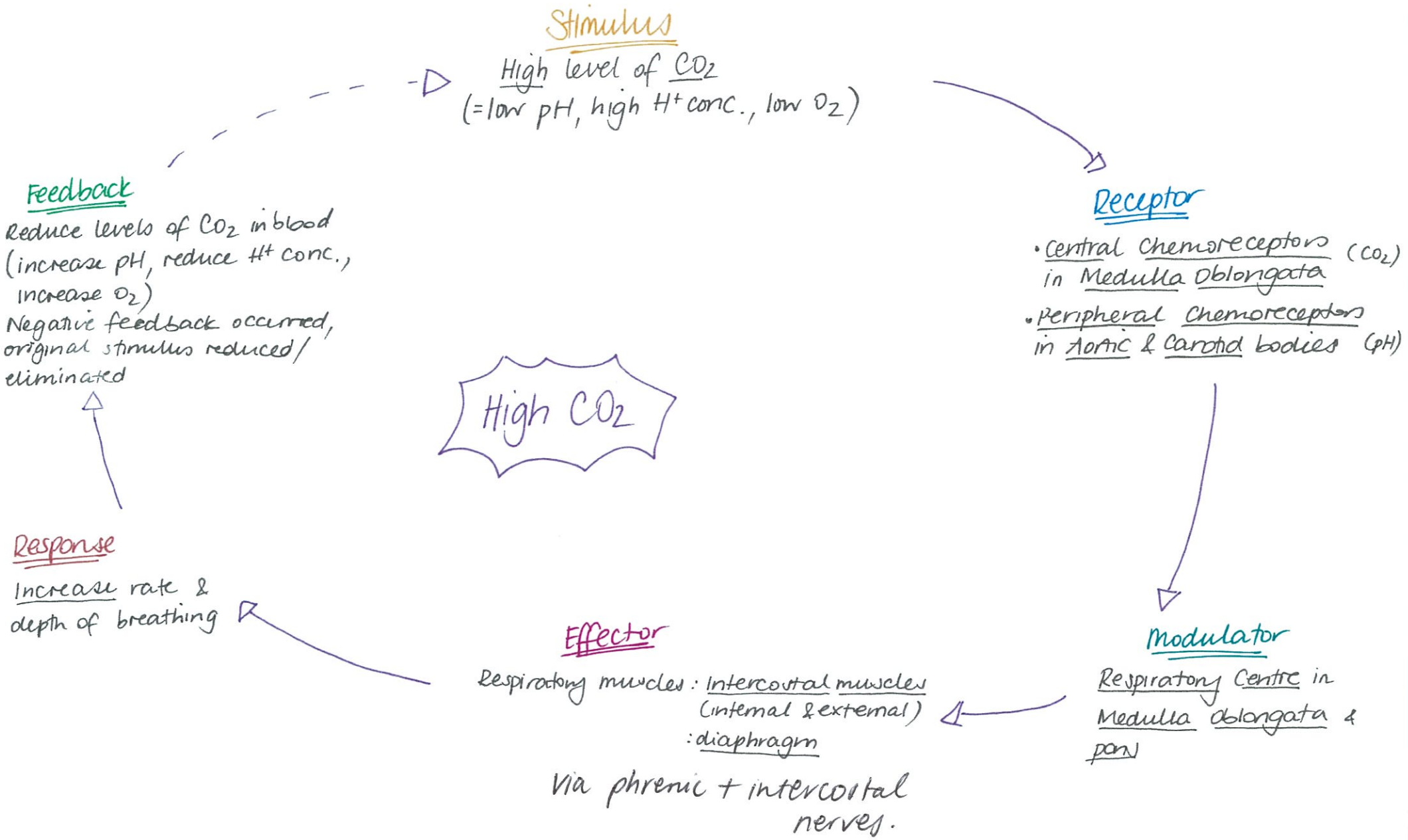

Stimulus.
Osmotic Pressure increases.
Water conc. in blood Decreases.
Receptor.
Osmoreceptors in hypothalamus.
Modulator.
Hypothalamus stimulates the Posterior Pituitary via nervous conduction to release more ADH (Antidiuretic Hormone).
Effector.
Distal Convoluted Tubules (DCT) and Collecting duct (CD) of nephron in kidney.
Response
Increased permeability of DCT + CD. More water reabsorbed into blood. Less urine produced. Urine more concentrated. Osmotic pressure of blood decreases. Water conc. in blood increases.
Feedback.
Decrease in osmotic pressure. Increase in water conc. in blood. Negative feedback has occured. Original stimulus reduced/eliminated.
ADH.

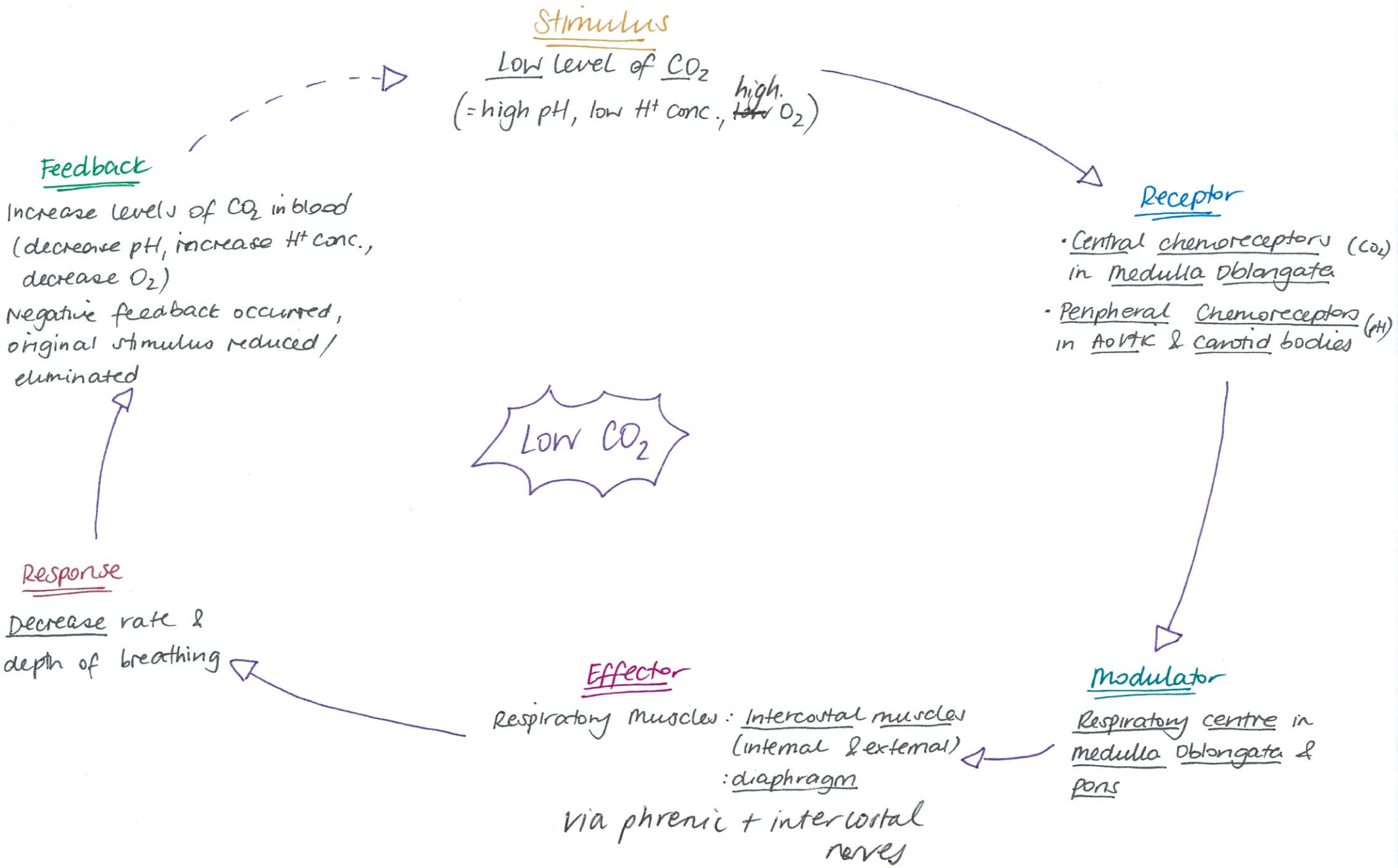

Stimulus.
Osmotic pressure decreases.
Water conc. in blood increases.
Receptor.
Osmoreceptors in hypothalamus
Modulator.
Hypothalamus reduces nervous stimulation to Posterior Pituitary to reduce amount of ADH (Antidiuretic Hormone) released.
* Note there is always some ADH released.*
Effector
Distal convoluted tubules (DCT) + collecting duct (CD) of nephron in kidney.
Response
Decrease in permeability of DCT + CD. Less water reabsorbed into blood. More urine produced. Urine less concentrated. Osmotic pressure increases. Water conc. in blood decreases.
Feedback.
Increase in osmotic pressure. Decrease in water conc. in blood. Negative feedback has occured. Original stimulus reduced/eliminated!
ADH.



↳ ALL OF THESE RESPONSES DECREASE BLOOD GLUCOSE LEVEL


Stimulus
Decrease in blood glucose levels (below 90mg glucose / 100mL blood)
Receptor
Alpha cells in Islets of Langerhans of pancreas
Modulator
Alpha cells in Islets of Langerhans of pancreas secrete glucagon into blood
Adrenal Cortex stimulated by hypothalamus → Anterior pituitary → ACTH
Adrenal Medulla stimulated by sympathetic nervous control
Effector
· Liver
· Adrenal Cortex
· Adrenal Medulla
Response
Liver): Glycogenolysis (glycogen → glucose)
: Gluconeogenesis (fats / protein → glucose)
Adrenal Cortex) : Secrete glucocorticoids (cortisol)
→ stimulates glycogenolysis
→ stimulates protein breakdown in muscles & conversion of a.a. → glucose in Liver
Adrenal Medulla) : Secretes adrenaline & noradrenaline
→ stimulates breakdown of glycogen in the liver & release glucose into the blood.
→ ALL OF THESE RESPONSES INCREASE BLOOD GLUCOSE LEVEL
Feedback
Increase in blood glucose level
Alpha cells no longer stimulated to secrete glucagon
Negative feedback occurred, original stimulus reduced/ eliminated.
LOW Blood Glucose


Stimulus
High level of CO_2
(=low pH, high H^+ conc., low O_2)
Receptor
• Central Chemoreceptors (CO_2) in Medulla Oblongata
• Peripheral Chemoreceptors (pH) in Aortic & Carotid bodies
Modulator
Respiratory Centre in Medulla Oblongata & pons
Effector
Respiratory muscles: Intercostal muscles (internal & external)
: diaphragm
Via phrenic + intercostal nerves.
Response
Increase rate & depth of breathing
Feedback
Reduce levels of CO_2 in blood (increase pH, reduce H^+ conc., increase O_2)
Negative feedback occurred, original stimulus reduced/ eliminated
High CO_2


Stimulus
Low level of CO_2
(= high pH, low H^+ conc., ~~low~~ high O_2)
Receptor
• Central chemoreceptors (CO_2) in medulla oblongata
• Peripheral chemoreceptors (pH) in aortic & carotid bodies
Modulator
Respiratory centre in medulla oblongata & pons
Effector
Respiratory muscles: intercostal muscles (internal & external)
: diaphragm
via phrenic + intercostal nerves
Response
Decrease rate & depth of breathing
Feedback
Increase levels of CO_2 in blood (decrease pH, increase H^+ conc., decrease O_2)
Negative feedback occurred, original stimulus reduced / eliminated
Low CO_2