Year 10 Biology 5: Homeostasis and Response Knowledge Organiser

1. Keywords

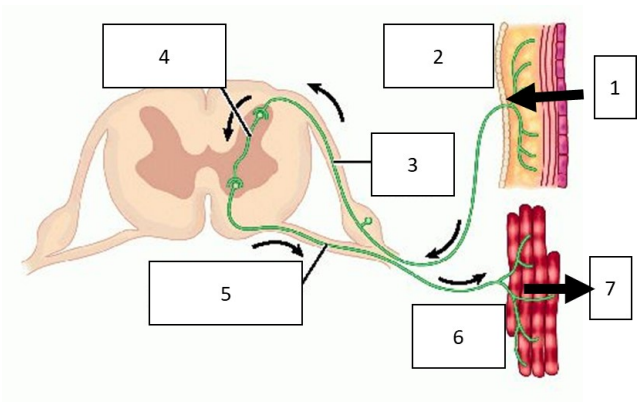
Homeostasis	The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.
Optimum conditions	The perfect conditions for an organism to survive and grow. E.g. blood glucose level, body temperature and water level.
Nervous response	Uses electrical signal in nerves to make fast changes
Chemical response	Uses hormones in the blood to make changes.
Reflex arc	A nervous response that is fast and automatic for protection. Does not involve the conscious brain.
CNS	(Central nervous system) The brain and the spinal chord
Neurone	Nerve cell. Carries an electrical signal from one end to the other

2. Nervous system: Reflex arc

No.	1	2	3	4	5	6	7
Section	Stimulus	Receptor	Sensory neurone	Co-ordinator	Motor neurone	Effector	Response
Definition	A change to the environment that triggers a nervous response	A cell which detects a specific stimulus	A neurones which carries electrical signal from receptor to CNS	The area that receives and processes the information	Neurone that connects the CNS to the effector	The organ that creates the correct response form the stimulus	The effect of the stimulus. Often designed to prevent injury
Example	Touching a flame	Pain receptor in skin	Sensory neurone	Brain Relay neurone	Motor neurone	Muscle gland	Movement

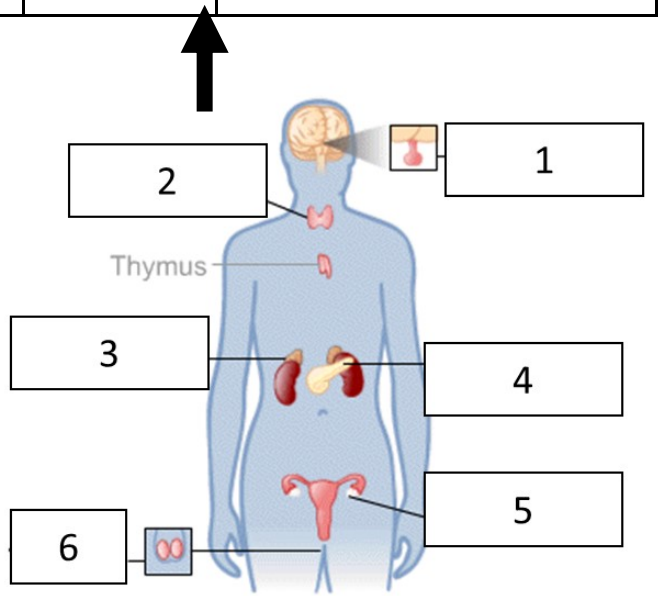
3. Hormonal control: Endocrine system

Endocrine system	A chemical response where glands secrete hormones into the blood which make changes around the body
Glands	Special tissues designed to produce specific chemical (hormones)
Secrete	Release



4. Major glands on the body

1	Pituitary gland	The 'master gland' makes hormones which affect other glands causing them to secrete hormones
2	Thyroid gland	Controls metabolism
3	Adrenal gland	Makes adrenalin
4	Pancreas	Controls blood sugar levels
5	Ovary	Produces female sex hormones
6	Testes	Produce male sex hormone



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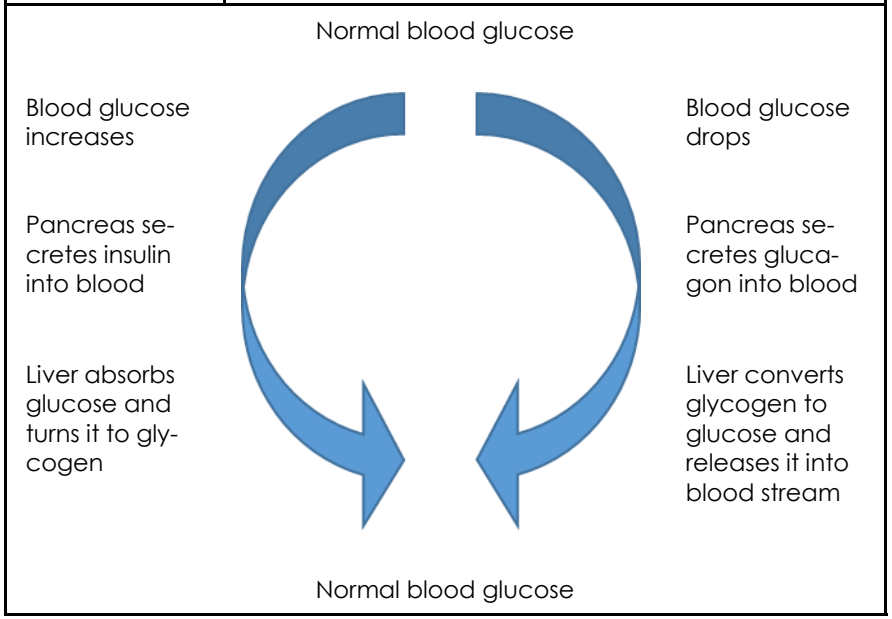
5. Control of blood glucose levels

Type 1 diabetes	When the pancreas is damaged from infection and cannot make insulin. Needs injections to treat
Type 2 diabetes	When poor diet and obesity cause body cells to not respond to insulin anymore. Treated with diet and exercise
Insulin	Hormone made in pancreas that reduces glucose levels in the blood
glycogen	The long term store of sugar in the body. Made in the liver

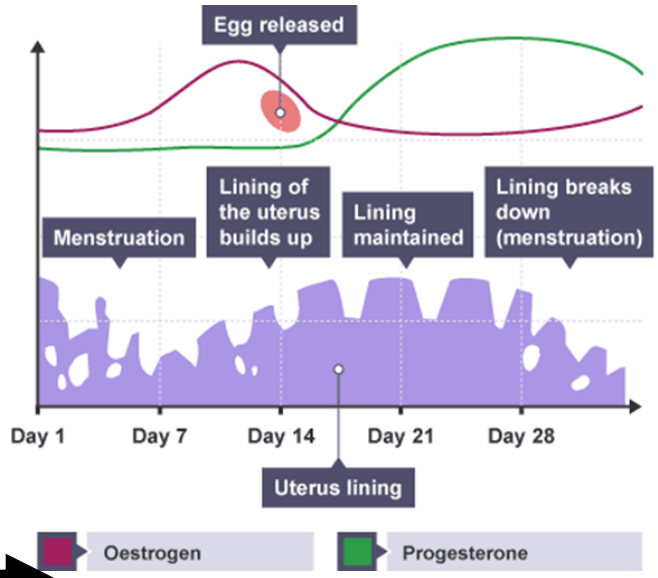
6. Control of blood glucose continued (HT ONLY)

Glucagon	A hormone which reduces blood glucose concentration by turning it into glycogen



7. Reproductive hormones

Hormone	Made in	Function
Testosterone	Testes	Creates male sexual changes at puberty including sperm production
Oestrogen	Ovary	Creates female sexual changes at puberty including ovulation
Follicle stimulating hormone (FSH)	Pituitary gland	Causes egg to mature in ovary
Luteinising hormone (LH)	Pituitary gland	Causes egg to be released by ovary
Progesterone	Ovary	Maintains lining of womb



8. Menstrual Cycle (HT only)

9. Contraception

Type	How it works
Oral (the pill)	Stops FSH so no egg released
Injection/ implant	Release progesterone which prevents egg maturation for months or years
Barrier (condoms)	Prevent sperm and egg meeting
Intrauterine (the coil)	Prevents embryo implanting
Spermicides	Kill sperm
Abstinence	Not having sex
Surgical (vasectomy/ hysterectomy)	Surgically sterilising the adult permanently

10. Negative feedback (HT ONLY)

Negative feedback	A system where the product reduces the stimulus to return the change to normal levels
Adrenalin	Fight or flight hormone. Increases heart rate and boosts blood supply of oxygen and glucose
Thyroxine	Controls metabolic rate and affects growth and development. Controlled by negative feedback.

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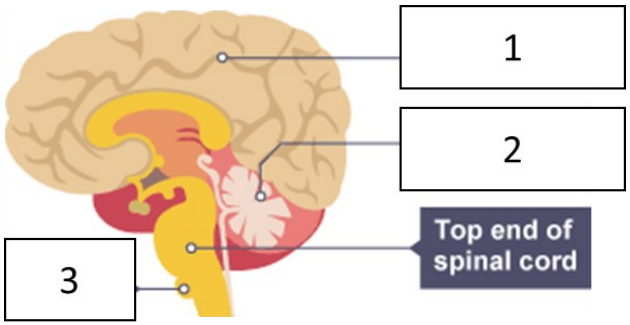
3. The brain (TRIPLE ONLY)

No	Name	Function
1	Cerebral cortex	High level functions like language, memory and consciousness
2	Cerebellum	Balance and coordination of muscles in the body
3	Medulla	Controls life supporting functions like breathing and heart rate. Key for homeostasis



4. The eye (TRIPLE ONLY)

No	Name	Function
	Sclera	White outer protective layer.
1	Suspensory ligaments	Connect ciliary muscles to lens
2	Iris	Controls the size of the pupil
3	Pupil	Hole in eye that lets light through. Wide in dark conditions small in light conditions
4	Cornea	Transparent protective layer
5	Ciliary muscles	Contract to change shape of lens to see near and far objects
6	Lens	Refracts light onto retina
7	Retina	Contain light sensitive rod and cone cells
8	Optic nerve	Send signals from retina to brain to make image

7. Control of body temperature (TRIPLE ONLY)

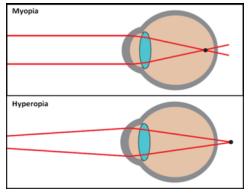
Thermoregulatory centre	Part of the brain that receives signals about temperature of the blood and skin
37°C	Optimum internal body temperature
Vasodilation	The widening of blood vessels near the surface of the skin
Vasoconstriction	The narrowing of blood vessels near the surface of the skin
Sweat	Liquid released from pores on skin to cool the body as it evaporates
Shivering	Involuntary muscle contractions to generate heat

How the body responds to changes in temperature

Too hot	Too cold
1.**Vasodilation** bring blood near the surface 2.**Sweating** increases 3.Heat is lost through evaporation and radiation 4.Body temp drops	1.**Vasoconstriction** take blood away from surface 2.**Sweating** stops 3.Muscles contractions **(shivering)** generate heat 4.Body temp increases

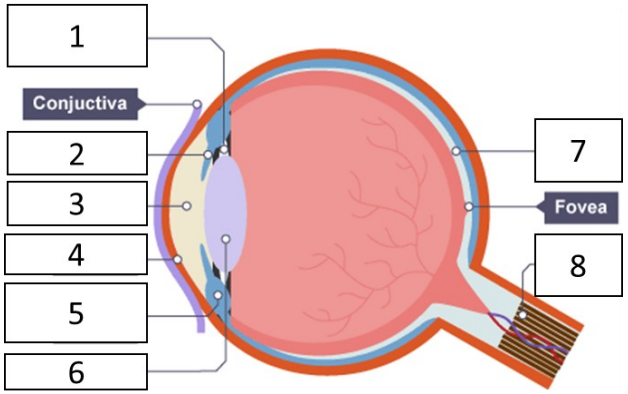
6. Vision problems (TRIPLE ONLY)

Name	Myopia	Hyperopia
Common name	Short-sighted	Long-sighted
Corrected by	•Glasses •Contact lenses •Laser eye surgery	



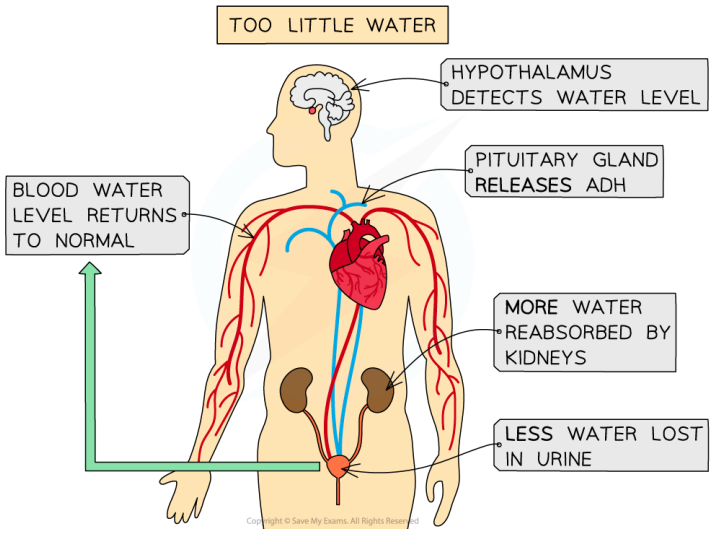
5. Adjusting focus (TRIPLE ONLY)

Object	Near	Distant
Ciliary muscles	Contract	Relax
Suspensory ligaments	Loosen	Tighten
Lens	Is thicker	Is thinner



12. Controlling water and nitrogen levels (TRIPLE ONLY)

Urea	The waste product made by the breakdown of amino acids in the liver.
Urine	The urea, excess water and ions not needed by the body. Made by the kidneys
Kidneys	The organ responsible for filtration and selective reabsorption
Selective reabsorption	When the kidneys reabsorb: •All of the glucose •Some of the mineral ions •Some of the water
Dialysis	A way of manually filtering the blood when the kidneys are no longer functioning. Whilst waiting for a transplant



13. Hormones and the kidneys (TRIPLE HT ONLY)

ADH (anti-diuretic hormone)	A hormone made in the pituitary gland which increase the reabsorption of water by kidney tubules

How ADH works:

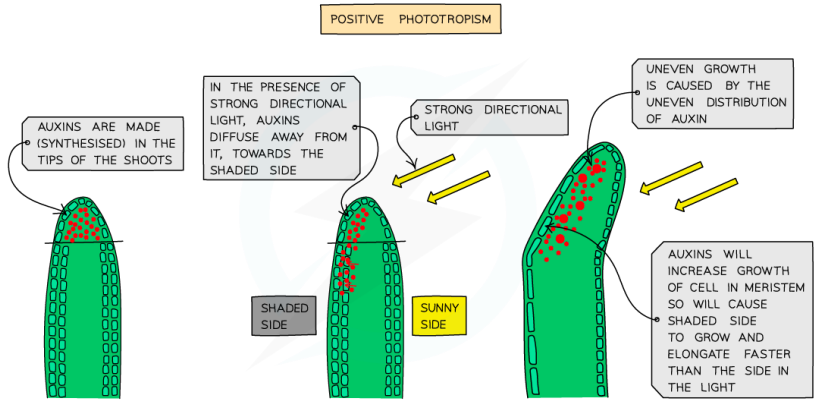
1.Blood is too concentrated 2.Pituitary gland releases ADH into blood. 3.ADH increase permeability of kidney tubules 4.More water is reabsorbed 5.Blood dilutes to normal levels. Urine is yellow.

19. Plant hormones (TRIPLE ONLY)

Phototropism	The shoot of a plant growing towards light. The root growing away form light
Gravitropism (geotropism)	The shoot of a plant growing up and the roots growing down
Auxin	Group of plant hormones which make cells in shoots grow more and cells in roots grow less. Used as rooting powder and weedkiller.

How tropisms work

Phototropism	1.Shaded side contains more auxin 2.So grows faster 3.Plant leans towards light
Gravitropism	1.Bottom of shoot has more auxin 2.So grows slower 3.Roots bends downwards



20. Other plant hormones (TRIPLE HT ONLY)

Gibberellins	Start seed germination. Used to promote fruit development and flowering
Ethene	Cell division and ripening fruit