EDEXCEL GCSE BIOLOGY ANIMAL COORDINATION PART 1

Response to internal and external change

The regulation of internal conditions of a cell or organism to maintain optimum conditions for function.

Controls in the human body	
	Blood glucose concentration
	Body temperature
	Water levels

These automatic control systems may involve nervous responses or chemical responses.

Homeostasis maintains optimal conditions for enzyme action (thermoregulation) and all cell functions (osmoregulation).

Homeostasis

Water and nitrogen balance (Biology only)

If body cells lose or gain too much water by osmosis they do no function efficiently.	*Uncontrolled water/ion urea loss*	Water exhaled in lungs, water, ions and urea in sweat.
	Controlled water/ion/urea loss	Via the kidneys in urine.

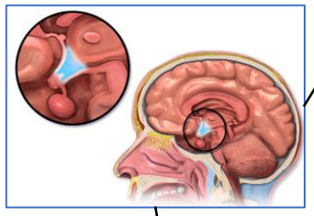
Kidney failure is treated by organ transplant or dialysis.

Kidney function	*Maintain water balance of the body.*	Produce urine by filtration of the blood and selective reabsorption of glucose, ions and water.

A dialysis machine removes urea from the blood by diffusion while maintaining ion and glucose levels.

(HT only) ADH	*Acts on kidney tubules to control water levels.*	Released by pituitary gland when blood is too concentrated. Water is reabsorbed back into the blood from the kidney tubules **(NEGATIVE FEEDBACK).**

(HT only) digestion of proteins results in excess amino acids. In the liver they are deaminated to form toxic ammonia which is converted to urea



Thermoregulatory centre (hypothalamus)

Control of body temperature (Biology only)

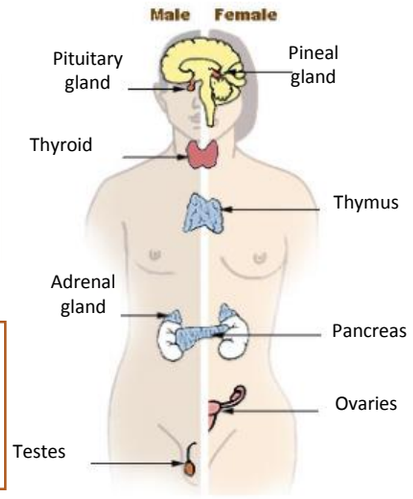
Monitoring body temperature	*Thermoregulatory centre*	Contains receptors sensitive to the temperature of the blood.
	Skin (dermis and epidermis)	Contains temperature receptors, sends nervous impulses to the thermoregulatory centre.

Body temperature		
	Too high	Blood vessels dilate (vasodilation), sweat produced from sweat glands.
	Too low	Blood vessels constrict (vasoconstriction), sweating stops, muscles contract (shivering).

(HT) Thermal energy is lost from blood near the surface of the skin, sweat evaporates transferring thermal energy.

(HT) Thermal energy loss at the surface of the skin is reduced, respiring muscles cells transfer chemical to thermal energy.

Human endocrine system



Endocrine system	*Composed of glands which secrete chemicals called hormones directly into the bloodstream.*	The blood carries the hormone to a target organ where is produces an effect. Compared to the nervous system effects are slower but act for longer.

Pituitary gland	*'Master gland'; secretes several hormones into the blood*	Stimulates other glands to produce hormones to bring about effects.

Control of blood glucose concentration

Negative feedback (HT only)		
	Adrenaline	Produced in adrenal glands, increases breathing/heart rate, blood flow to muscles, stimulates liver to convert glycogen to glucose. Prepares body for 'fight or flight'.
	Thyroxine	Produced in the thyroid gland, stimulates the basal metabolic rate. Important in growth and development.

Increasing thyroxine levels prevent the release of thyroid stimulating hormone which stops the release of thyroxine.

Blood glucose concentration	
Monitored and controlled by the pancreas	
Too high	**(HT only)** Too low
Pancreas produces the hormone insulin, glucose moves from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.	Pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.

Diabetes	
Type 1	*Type 2*
Pancreas fails to produce sufficient insulin leading to uncontrolled blood glucose levels. Normally treated by insulin injection.	Obesity is a risk factor. Body cells no longer respond to insulin. Common treatments include changing by diet and increasing exercise.

(HT) Rising glucose levels inhibit the release of glucagon in a negative feedback system. Insulin is released to reduce glucose levels and which cause the pancreas to release glucagon

EDEXCEL GCSE BIOLOGY ANIMAL COORDINATION PART 1

Response to internal and external change

Homeostasis

The regulation of internal conditions of a cell or organism to maintain optimum conditions for function.

Blood glucose concentration	These automatic control systems may involve nervous responses or chemical responses.
Body temperature	
Water levels	

Homeostasis maintains optimal conditions for enzyme action (thermoregulation) and all cell functions (osmoregulation).

Water and nitrogen balance (Biology only)

Uncontrolled water/ion urea loss	Water exhaled in lungs, water, ions and urea in sweat.
Controlled water/ion/urea loss	Via the kidneys in urine.

Kidney failure is treated by organ transplant or dialysis.

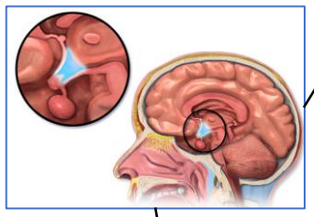
Maintain water balance of the body.	Produce urine by filtration of the blood and selective reabsorption of glucose, ions and water.

A dialysis machine removes urea from the blood by diffusion while maintaining ion and glucose levels.

Acts on kidney tubules to control water levels.	Released by pituitary gland when blood is too concentrated. Water is reabsorbed back into the blood from the kidney tubules **(NEGATIVE FEEDBACK).**

(HT only) digestion of proteins results in excess amino acids. In the liver they are deaminated to form toxic ammonia which is converted to urea

Control of body temperature (Biology only)



Thermoregulatory centre (hypothalamus)

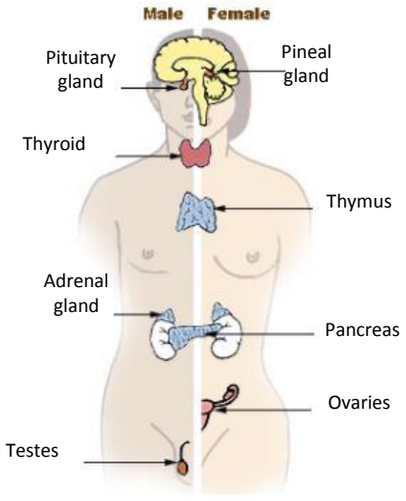
Thermoregulatory centre	Contains receptors sensitive to the temperature of the blood.
Skin (dermis and epidermis)	Contains temperature receptors, sends nervous impulses to the thermoregulatory centre.

Too high	Blood vessels dilate (vasodilation), sweat produced from sweat glands.
Too low	Blood vessels constrict (vasoconstriction), sweating stops, muscles contract (shivering).

(HT) Thermal energy is lost from blood near the surface of the skin, sweat evaporates transferring thermal energy.

(HT) Thermal energy loss at the surface of the skin is reduced, respiring muscles cells transfer chemical to thermal energy.

Human endocrine system



Composed of glands which secrete chemicals called hormones directly into the bloodstream.	The blood carries the hormone to a target organ where is produces an effect. Compared to the nervous system effects are slower but act for longer.

'Master gland'; secretes several hormones into the blood	Stimulates other glands to produce hormones to bring about effects.

Control of blood glucose concentration

Adrenaline	Produced in adrenal glands, increases breathing/heart rate, blood flow to muscles, stimulates liver to convert glycogen to glucose. Prepares body for 'fight or flight'.
Thyroxine	Produced in the thyroid gland, stimulates the basal metabolic rate. Important in growth and development.

Increasing thyroxine levels prevent the release of thyroid stimulating hormone which stops the release of thyroxine.

Monitored and controlled by the pancreas

Too high	**(HT only)** Too low
Pancreas produces the hormone insulin, glucose moves from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.	Pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.

Type 1	***Type 2***
Pancreas fails to produce sufficient insulin leading to uncontrolled blood glucose levels. Normally treated by insulin injection.	Obesity is a risk factor. Body cells no longer respond to insulin. Common treatments include changing by diet and increasing exercise.

(HT) Rising glucose levels inhibit the release of glucagon in a negative feedback system. Insulin is released to reduce glucose levels and which cause the pancreas to release glucagon

EDEXCEL GCSE BIOLOGY ANIMAL COORDINATION PART 1

Response to internal and external change

The regulation of internal conditions of a cell or organism to maintain optimum conditions for function.

		These automatic control systems may involve nervous responses or chemical responses.

Homeostasis maintains optimal conditions for enzyme action (thermoregulation) and all cell functions (osmoregulation).

Homeostasis

Water and nitrogen balance (Biology only)

		Water exhaled in lungs, water, ions and urea in sweat.
		Via the kidneys in urine.

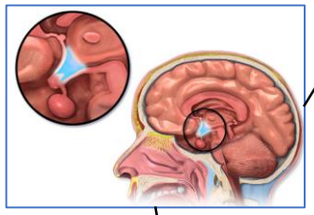
Kidney failure is treated by organ transplant or dialysis.

		Produce urine by filtration of the blood and selective reabsorption of glucose, ions and water.

A dialysis machine removes urea from the blood by diffusion while maintaining ion and glucose levels.

		Released by pituitary gland when blood is too concentrated. Water is reabsorbed back into the blood from the kidney tubules **(NEGATIVE FEEDBACK).**

(HT only) digestion of proteins results in excess amino acids. In the liver they are deaminated to form toxic ammonia which is converted to urea



Thermoregulatory centre (hypothalamus)

Control of body temperature (Biology only)

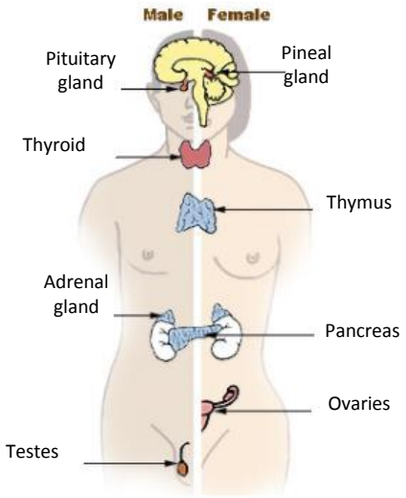
		Contains receptors sensitive to the temperature of the blood.
		Contains temperature receptors, sends nervous impulses to the thermoregulatory centre.

		Blood vessels dilate (vasodilation), sweat produced from sweat glands.
		Blood vessels constrict (vasoconstriction), sweating stops, muscles contract (shivering).

(HT) Thermal energy is lost from blood near the surface of the skin, sweat evaporates transferring thermal energy.

(HT) Thermal energy loss at the surface of the skin is reduced, respiring muscles cells transfer chemical to thermal energy.

Human endocrine system



		The blood carries the hormone to a target organ where is produces an effect. Compared to the nervous system effects are slower but act for longer.
		Stimulates other glands to produce hormones to bring about effects.

Control of blood glucose concentration

		Produced in adrenal glands, increases breathing/heart rate, blood flow to muscles, stimulates liver to convert glycogen to glucose. Prepares body for 'fight or flight'.
		Produced in the thyroid gland, stimulates the basal metabolic rate. Important in growth and development.

Increasing thyroxine levels prevent the release of thyroid stimulating hormone which stops the release of thyroxine.

Too high	**(HT only)** Too low
Pancreas produces the hormone insulin, glucose moves from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.	Pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.

Pancreas fails to produce sufficient insulin leading to uncontrolled blood glucose levels. Normally treated by insulin injection.	Obesity is a risk factor. Body cells no longer respond to insulin. Common treatments include changing by diet and increasing exercise.

(HT) Rising glucose levels inhibit the release of glucagon in a negative feedback system. Insulin is released to reduce glucose levels and which cause the pancreas to release glucagon

EDEXCEL GCSE BIOLOGY ANIMAL COORDINATION PART 1

Response to internal and external change

The regulation of internal conditions of a cell or organism to maintain optimum conditions for function.

Homeostasis maintains optimal conditions for enzyme action (thermoregulation) and all cell functions (osmoregulation).

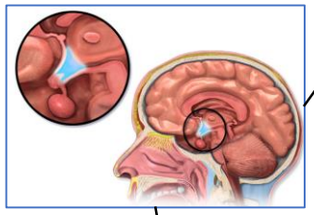
Homeostasis

Water and nitrogen balance (Biology only)

(HT only) digestion of proteins results in excess amino acids. In the liver they are deaminated to form toxic ammonia which is converted to urea

Kidney failure is treated by organ transplant or dialysis.

A dialysis machine removes urea from the blood by diffusion while maintaining ion and glucose levels.



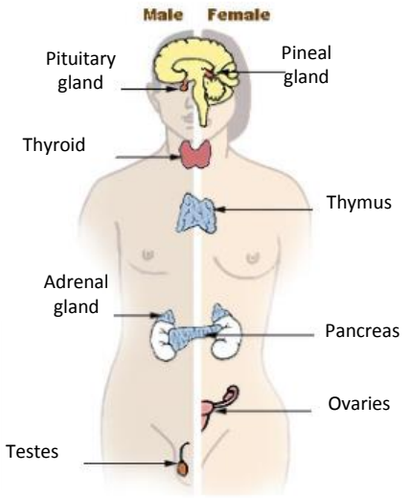
Thermoregulatory centre (hypothalamus)

Control of body temperature (Biology only)

(HT) Thermal energy is lost from blood near the surface of the skin, sweat evaporates transferring thermal energy.

(HT) Thermal energy loss at the surface of the skin is reduced, respiring muscles cells transfer chemical to thermal energy.

Human endocrine system



Control of blood glucose concentration

Increasing thyroxine levels prevent the release of thyroid stimulating hormone which stops the release of thyroxine.

(HT) Rising glucose levels inhibit the release of glucagon in a negative feedback system. Insulin is released to reduce glucose levels and which cause the pancreas to release glucagon