

Integration of body systems What is system integration?	Integration of body systems Emergent property (with the IB example)
Integration of body systems Name three ways organs are integrated in animals.	Integration of body systems What two roles of the brain make it the central integration organ?
Integration of body systems Conscious vs unconscious processes	Integration of body systems Sensory neuron vs motor neuron
Integration of body systems What does a transverse section of a nerve show?	Integration of body systems Pain reflex arc, in order

A property of the whole that its parts lack, arising from integration. A cheetah is an effective predator through integration of its body systems.

Coordination of the component parts of a system so that they collectively perform an overall function. It is a necessary process in living systems.

Processing information combined from several inputs, and learning and memory.

Nervous signalling, hormonal (endocrine) signalling, and transport of materials and energy by the blood.

Sensory: carries messages from receptor cells to the CNS. Motor: carries output from the CNS (cerebral hemispheres) to muscles, stimulating contraction.

Conscious: aware and voluntary, coordinated by cerebral hemispheres.
Unconscious: no awareness or decision (eg reflexes), can be coordinated by the spinal cord.

Free nerve ending in hand → sensory neuron → interneuron in spinal cord grey matter → motor neuron → skeletal muscle contracts.

A protective sheath around bundles of nerve fibres of both sensory and motor neurons, some myelinated and some unmyelinated.

Integration of body systems

What is the effector in a pain reflex arc?

Integration of body systems

Role of the cerebellum

Integration of body systems

Melatonin: source and pattern

Integration of body systems

Four effects of epinephrine

Integration of body systems

How do the hypothalamus and pituitary control the endocrine system?

Integration of body systems

Baroreceptors: what and where?

Integration of body systems

How does the medulla change heart rate?

Integration of body systems

Why does blood pH fall during exercise?

Coordinates skeletal muscle contraction and balance, giving smooth, accurate movement and posture.

A skeletal muscle, which contracts to withdraw the body part.

Increased heart rate and stroke volume; blood diverted to skeletal muscles; airways widen and ventilation increases; liver glycogen broken down to glucose.

Secreted by the pineal gland; rises in the evening darkness, high at night, low in daylight. Helps set the sleep-wake cycle.

Monitor blood pressure; located in the walls of the aortic arch and carotid arteries.

The hypothalamus receives nervous and blood-borne information and signals the pituitary, which secretes hormones that regulate other endocrine glands.

More CO₂ from respiration forms carbonic acid, which releases H⁺ ions.

Impulses along the sympathetic nerve increase heart rate and stroke volume; impulses along the vagus nerve decrease heart rate.

Integration of body systems

Effectors in ventilation control

Integration of body systems

Which parts of gut movement are voluntary?

Integration of body systems

Enteric nervous system (ENS)

Initiation of swallowing and egestion of faeces, controlled by the CNS. Peristalsis in between is involuntary.

The diaphragm and intercostal muscles, signalled by the medulla after chemoreceptors in the brainstem detect a fall in pH.

Network of neurons in the gut wall that controls peristalsis involuntarily, coordinating passage of material through the gut.