

Neural signalling · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Neurons · 1.1

Reasoning

A stronger stimulus can increase impulse frequency while each action potential remains a similar size. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Neurons · 2.1

Reasoning

An action potential is a brief change in membrane potential involving voltage-gated ion channels. Depolarization followed by repolarization propagates along a neuron. At a chemical synapse, transmitter release can alter the next cell membrane potential.

action potential: A brief propagating change in membrane potential; synapse: A junction for communication between cells.

Neurons · 3.1

Reasoning

The all-or-none principle applies to an individual action potential. Stimulus information can be encoded by frequency and recruitment. Myelination permits saltatory conduction between nodes rather than making ions move freely through myelin. Interpret supplied voltage-time traces and compare time intervals. Identify threshold, rising phase and recovery before explaining ions. Use classroom models rather than electrical stimulation of people.

Neurons · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: 30 impulses occur in 0.50 s.

Frequency = count/time = $30/0.50 = 60$ Hz. This is impulse frequency, not an estimate of propagation speed.

Neurons · 4.2

Reasoning

24 impulses occur in 0.40 s. Find impulse frequency. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

Neurons · 5.1

Reasoning

A neurotransmitter diffuses across the synaptic cleft; an action potential does not jump intact through the liquid gap. Excitatory input does not guarantee the postsynaptic cell reaches threshold. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Neurons · 5.2

Reasoning

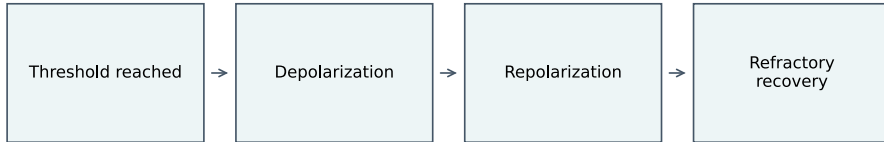
A stronger stimulus always makes each action potential larger. This claim is false: A neurotransmitter diffuses across the synaptic cleft; an action potential does not jump intact through the liquid gap. Excitatory input does not guarantee the postsynaptic cell reaches threshold.

Neurons · 5.3

Reasoning

Neural signalling: impulses and synapses: The all-or-none principle applies to an individual action potential. Stimulus information can be encoded by frequency and recruitment. Myelination permits saltatory conduction between nodes rather than making ions move freely through myelin.

Neurons · diagram



- Original teaching diagram: Neural signalling: impulses and synapses
- Use the labels and the stated model together.

Neurons · original transfer

Your turn

Two records have 30 impulses in 0.5 s and 30 impulses in 1.0 s. Compare frequency. Would either observation determine nerve conduction speed?

Neurons · transfer reasoning

Method and interpretation

60 and 30 Hz. Frequency is count per time; speed requires propagation distance and delay between locations. These are different measured quantities.

Check yourself

- Explain action potential using the stated model.
- Explain synapse using the stated model.
- Change one value in the original transfer; explain which assumption still matters.