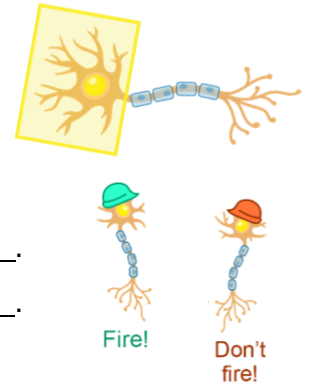


TOPIC: GRADED POTENTIALS

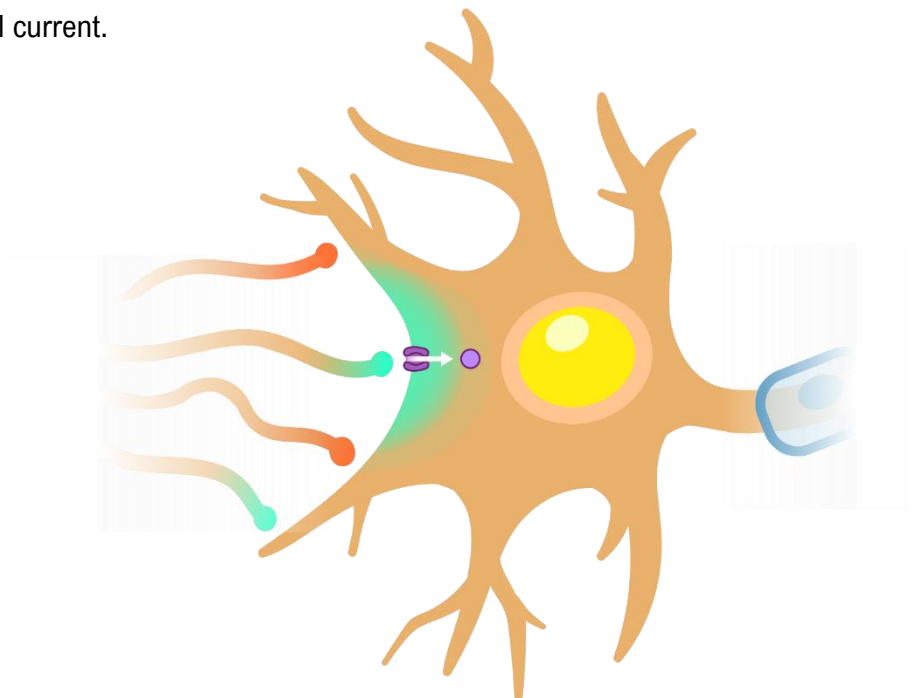
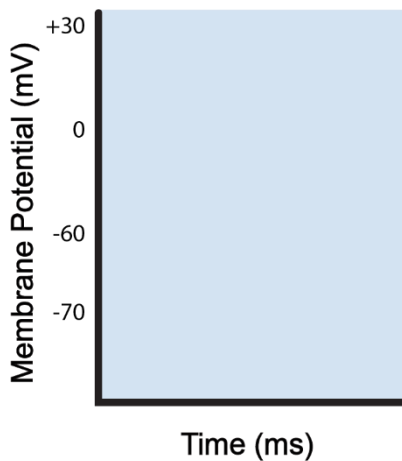
● Postsynaptic Potential:

- Change in membrane potential at postsynaptic terminal of chemical synapse.
- Postsynaptic potentials are _____ potentials. Two types:
 - **Excitatory Postsynaptic Potentials (EPSPs):** Make membrane more _____.
 - **Inhibitory Postsynaptic Potentials (IPSPs):** Make membrane more _____.



● Sequence of a **Depolarizing** Graded Potential:

- **Step 1:** Gated **Na⁺** channels open in response to _____.
- **Step 2:** **Na⁺** ions enter the cell.
- **Step 3:** Inside of cell _____.
- **Step 4:** Depolarization spreads in local current.
- **Step 5:** Current dissipates.



EXAMPLE: When voltage gated sodium channels open in response to a stimulus, what effect does it have on the neuron?

- a) Potassium will rush out of the cell.
- b) Sodium enters the cell.
- c) The influx of positive ions causes the cell to depolarize.
- d) Both b and c.

TOPIC: GRADED POTENTIALS

PRACTICE: A graded potential is strongest at the _____:

- a) Initial zone of the axon.
- b) Location on the membrane with the most voltage-gated potassium channels.
- c) Site of stimulation.
- d) Axolemma.

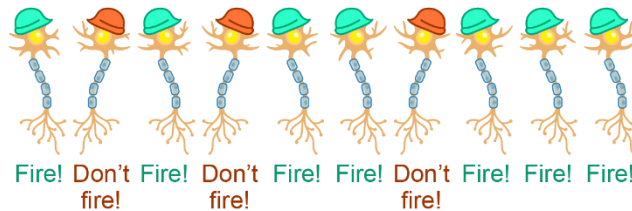
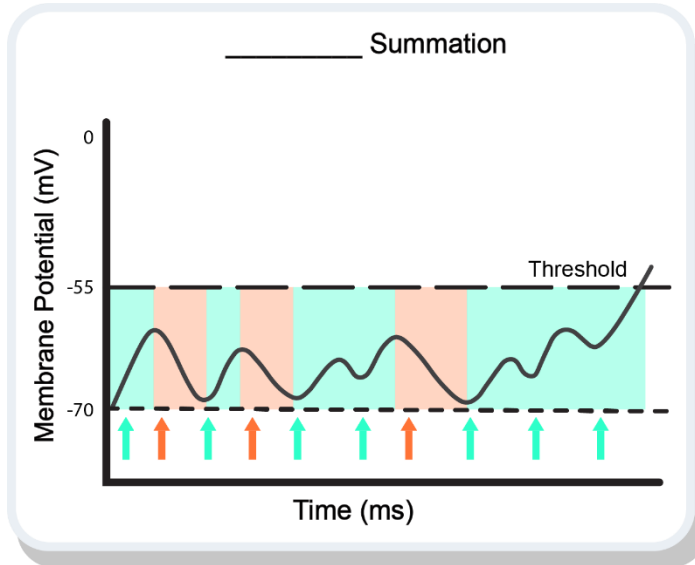
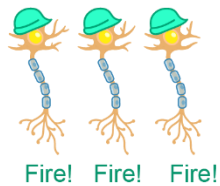
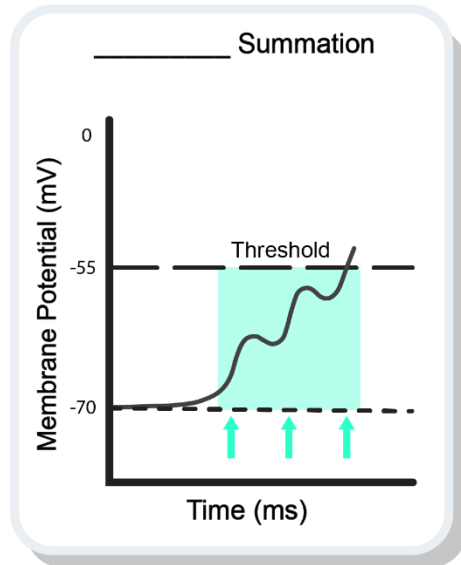
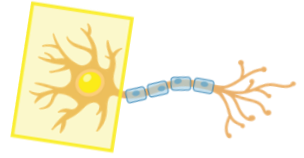
PRACTICE: An excitatory postsynaptic potential (EPSP) is _____.

- a) the same as a nerve impulse along an axon.
- b) a result of a stimulus strong enough to produce threshold.
- c) a graded depolarization produced by the arrival of a neurotransmitter.
- d) an action potential complying with the all-or-none principle.

TOPIC: GRADED POTENTIALS

Summation

- **Summation:** Adding _____ postsynaptic potentials at initial segment. Two types:
 - **Temporal Summation:** Summation of graded potentials at one synapse overlapping in _____.
 - **Spatial Summation:** Summation of multiple graded potentials in close _____.



EXAMPLE: Imagine fifteen neurons synapse on one postsynaptic neuron. At the trigger zone, 13 of the neurons produce EPSPs of 2 mV each, and the other 2 produce IPSPs of 3 mV each. The threshold for the postsynaptic cell is -55 mV. In this scenario, would an action potential be produced? The postsynaptic neuron has a resting membrane potential of -70 mV.

TOPIC: GRADED POTENTIALS

PRACTICE: When a second EPSP arrives at a single synapse before the effects of the first have disappeared, what results?

- a) Temporal summation.
- b) Spatial summation.
- c) Hyperpolarization.
- d) Inhibition of the impulse.

PRACTICE: The EPSPs from two different synapses occur at the same time and cause a larger depolarization than either one alone can cause. This is an example of:

- a) Presynaptic inhibition.
- b) Postsynaptic melding.
- c) Temporal summation.
- d) Spatial summation.