



- → Stimulus excites membrane
- → Excitation threshold is reached
- → Peak action potential
- → Period of membrane hyperpolarization
- → Return to resting potential

\*Note: Action potentials are "all-or-nothing".

#### \*Steps of an action potential

- ① Graded membrane potential excites the membrane out of resting potential;  $\text{Na}^+$  leak channels allow for depolarization to begin.
- ② Depolarization excites the membrane & allows it to reach the threshold of  $-60\text{mV}$ . Once crossed, voltage-gated  $\text{Na}^+$  pumps open, causing an influx of  $\text{Na}^+$ .
- ③ Membrane depolarizes to  $+30\text{mV}$  & reaches peak action potential → This triggers  $\text{Na}^+$  channels to close & voltage-gated  $\text{K}^+$  channels open. There is an efflux of  $\text{K}^+$  out of the cell, beginning membrane repolarization.
- ④ Repolarization brings the membrane back down to the  $-60\text{mV}$ ; voltage-gated  $\text{K}^+$  channels begin to close, voltage-gated  $\text{Na}^+$  channels are re-activated.
- ⑤ There is a slight delay in  $\text{K}^+$  channel closure, resulting in membrane hyperpolarization, before membrane returns to resting potential.