Action Potential

- If an electrical current above a threshold level is applied to the membrane it causes a massive change in the potential difference
- Potential difference reversed
- Inside of axon positive and outside negative —> depolarisation
- Potential difference becomes about 40mV for about 3ms
- Membrane returns to resting potential as soon as possible —> more impulses can be conducted —> repolarisation
- The large change in the voltage across the membrane is known as action potential



What causes an action potential?

1.When a receptor is stimulated, it will create a positive environment inside the cell

2. There is a change in permeability to sodium ions and potassium ions. The membrane becomes more permeable to sodium, so sodium ions diffuse into the neurone down the codium ion electrochemical gradient. This makes the residued the neurone less negative.

3. As this happens the membrane coolables - the resting potential of the cell starts to decrease. If this depolarisation reaches a certain level, called the threshold level (around -55mV), more sodium ion channels open (positive feedback) and more sodium ions diffuse into the neurone.

- 4. An action potential is generate and an impulse will be transmitted if it does not reach this level nothing will happen.
- 5. At a potential differences of about +40mV is reached the sodium ion channels close and potassium ion channels open. The membrane is more permeable to potassium so potassium ions diffuse out of the neurone down the potassium ion concentration gradient. This starts to get the membrane back to its resting potential. —> Repolarisation
- 6. Potassium ion channels are slow to close so there is a slight overshoot where too many potassium ions diffuse out of the neurone. The potential difference becomes more negative than the resting potential. —> Hyperpolarisation
- 7. The ion channels are reset. The sodium-potassium pump returns the membrane to its resting potential and maintains it until the membrane's excited by another stimulus.
- 8. After an action potential, the neurone cell membrane cannot be excited again straight away. This is because the ion channels are recovering and they can't be made to open sodium