**Key Knowledge: Tunnelling Electron Microscope**



4. Specimen must be very thin and in evacuated chamber
5. Electrons incident in sample can do three things:
- pass straight through specimen
- be absorbed by specimen
- be diffracted by specimen

3. Condenser lens: uses magnetic fields to deflects electrons into parallel beam that is directed straight at the specimen

1. Electrons produced by thermionic emission
2. Electrons are accelerated using a potential difference between filament and anode

6. Objective lens forms magnified image

7. Projector lens magnifies image further and forms image on the screen

8. At screen:
- darker patches due to thicker or denser parts of specimen where electrons were absorbed
- lighter patches due to thinker/less dense part of specimen that enable electrons to be transmitted

**Factors that affect the resolution (~1 pm):**

1. If any electron are diffraction: objective aperture is set to smallest size to prevent diffracted electron beams from contributing to the image on screen
2. Decreasing wavelength increases resolution
	1. Lower wavelength achieved by faster speeds
	2. Faster speed achieved by increasing the anode voltage
3. If temperature of filament isn’t constant then electrons are emitted with different speeds which alters their wavelength
4. The speed of electrons is not always the same which causes different pathways through the lens and so aberration
5. The sample thickness reduces the speed of the electrons increasing the wavelength•        The sample thickness reduces the speed of the electrons increasing the wavelength and decreasing the detail.