**Noteguide for Closest Approach - Videos 27J Name**

**Rutherford** – Discovered the nucleus by scattering alpha particles (2 protons, 2 neutrons bound together) off of gold foil.



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| Relationship between energy voltage and charge:Ve = Voltage (V)q = Charge (C) Ep = Electrical Potential energy (J) | Voltage due to a point charge:Ve = Potential near a point charge (V)k = 8.99x109 Nm2/C2q = Charge (C)r = distance to charge (m) |
| Kinetic Energy:Ek = Kinetic Energy (J)m = mass (kg)v = velocity (m/s) |  |

Example 1: What is the closest approach of an alpha (q = 2e, m = 6.644E-27 kg) particle going 2.6 x 106 m/s if it approaches a carbon nucleus head on?

Example 2: Through what potential must you accelerate an alpha particle to penetrate a Uranium (Z = 92) nucleus? (r = 7.4 fm) (1 fm = 1x10-15 m)

Whiteboards:

What is the closest approach in nm of an Alpha (2p2n) particle going 15,000 m/s to a Gold (Z = 79) nucleus? (49 nm)

An Alpha particle’s closest approach brings it to within 47 fm of a Gold nucleus.

What is its energy in eV? (4.8 MeV or 4.8x106 eV)