Unit 7 – Vocabulary and Equations – Electrostatics

Equations & Constants

$f = 1/T$, $v = f\lambda$ wave speed = v, Period = T, Frequency = f,
$V_{light} = c = 3 \times 10^8$ m/s, $v_{sound} \sim 340$ m/s
$v_{sound} = 331 + 0.6T(°C)$;
Lens/mirror: $1/d_o + 1/d_i = 1/f$ prescription = 1/f (f in meters)
$e = 1.60 \times 10^{-19}$ C
$k = 9.0 \times 10^9$ Nm²/C² Q = ne V = W/q = J/C

$A_0 = 27.5$ Hz
$2^{(1/12)} = 1.05946$ I Δ inversely with r^2
Wave length = λ d = v t Beats = $|f_1 - f_2|$
$M = V_0/v_{sound}$ Δ: +10 dB = 2x Vol = 10x I

$$F = k\frac{q_1 q_2}{r^2} \qquad E = \frac{F}{q}$$

Life Skills & Traditional Objectives - Williams

1. The student understands all vocabulary, math, demos, videos, class assignments and discussions
2. The student remembers objectives & vocabulary from previous units.
3. The student knows both types of fundamental electric charges, and know their strength relative to gravity
4. The student understands conservation of charge is as fundamental as conservation of energy and mass
5. The student can use a Triboelectric series properly, how an electroscope works and polarized compared to charged
6. The student understands charges are quantized, how this relates to the fundamental charge, and integer charge values
7. The student can explain why some elements are conductors and some are insulators by how tightly electrons are held
8. The student can explain/predict the attraction between two insulators using polarization on an atomic level
9. The student can explain the attraction between a conductor and an insulator using polarization
10. The student understand charging by conduction and by induction and can explain and contrast the two
11. The student uses Coulomb's law to find absolute or relative attractive/repulsive forces, charges, or value for r
12. The student understands field forces and at the microscopic level there is no such thing as a true contact force
13. The student knows and understands the standard convention in physics of a test charge and its sign
14. Students can compute electric field strength and direction in both absolute and relative terms graphically and by math
15. The student understands electric fields, electric field lines and how electric field strength and direction are depicted
16. Students observe single-charge and dual-charge electric field lines and critically judge that the depiction makes sense
17. The student understands why charges accumulate more densely on pointed surfaces
18. The student understands electrical potential energy and its relationship to voltage and charge
19. Students know what a capacitor is (Leyden jar) and that current from it can pass through people holding hands
20. The student knows how lightning forms, why it's so powerful, how cars protect us, and lightning safety basics
21. The student knows what a Van de Graaff generator and Faraday cage are and how they work

DuPage ROE Objectives

501. I can identify the charge on each sub-atomic particle.
502. I can identify which sub atomic particle moves in a conductor.
503. I can compare and contrast conductors and insulators.
504. I can predict how charges will redistribute based on charging by contact and induction.
505. I can predict attraction and repulsion between charged and neutral objects and the processes that cause them.
506. I can apply Coulomb's Law.
507. I can describe an electric field and identify the electric field diagrams for a one or two charge system.
508. I can identify the direction of the force on a charged object in an electric field.

Numbered Unit Vocabulary list (you need to know all previous vocabulary too)

1. charge	12. fundamental charge	23. coulomb (C)	34. Triboelectric series
2. positive	13. elementary charge	24. electrostatic force	35. electrical potential energy
3. negative	14. quantized	25. electromagnetic force	
4. static electricity	15. conductor	26. electrical force	36. Joule (J)
5. current electricity	16. insulator	27. field force	37. Voltage
6. attraction	17. charging by conduction	28. contact force	38. Volt (V)
7. repulsion	18. charging by induction	29. electric field	39. Electroscope
8. proton	19. ground	30. electric field strength	40. Tesla coil
9. neutron	20. polarization	31. test charge	41. Faraday cage
10. electron	21. Coulomb's law	32. vector, scalar	42. Van de Graaff generator
11. conservation of charge	22. Coulomb's constant (k)	33. resultant	43. Capacitor
			44. Leyden jar