NAME: _____ DATE:

WolgiePhys 1st E & M Test Learning Target Review Check-list

Charges Learning Targets	Rating
Charge and Coulomb's Law	
A) Students should understand the concept of electric charge, so they can:	
(1) Describe the types of charge and the attraction and repulsion of charges.	
(2) Describe polarization and induced charges.	
B) Students should understand Coulomb's Law and the principle of superposition, so they can:	
(1) Calculate the magnitude and direction of the force on a positive or negative charge due to other specified point charges.	
(2) Analyze the motion of a particle of specified charge and mass under the influence of an electrostatic force.	
Electrostatics and Conductors	
(A) Students should understand the nature of electric fields in and around conductors, so they can:	
(1) Explain the mechanics responsible for the absence of electric field inside a conductor, and know that all excess charge must reside on the surface of the conductor.	
(2) Explain why a conductor must be an equipotential, and apply this principle in analyzing what happens when conductors are connected by wires.	
(3) Show that all excess charge on a conductor must reside on its surface and that the field outside the conductor must be perpendicular to the surface.	
(B) Students should be able to describe and sketch a graph of the electric field and potential inside and outside a charged conducting sphere.	
(C) Students should understand induced charge and electrostatic shielding, so they can:	
(1) Describe the process of charging by induction.	
(2) Explain why a neutral conductor is attracted to a charged object.	
(3) Explain why there can be no electric field in a charge-free region completely surrounded by a single conductor, and recognize consequences of this result.	
(4) Explain why the electric field outside a closed conducting surface cannot depend on the precise location of charge in the space enclosed by the conductor, and identify consequences of this result.	
Gauss Learning Targets	**Rating**
(A) Students should understand the relationship between electric field and electric flux, so they can:	
(1) Calculate the flux of an electric field through an arbitrary surface or of a field uniform in magnitude over a Gaussian surface and perpendicular to it.	
(2) Calculate the flux of the electric field through a rectangle when the field is perpendicular to the rectangle and a function of one coordinate only.	
(3) State and apply the relationship between flux and lines of force.	
(B) Students should understand Gauss's Law, so they can:	
(1) State the law in integral form, and apply it qualitatively to relate flux and electric charge for a specified surface.	
(2) Apply the law, along with symmetry arguments, to determine the electric field for a planar, spherical, or cylindrically symmetric charge distribution.	
(3) Apply the law to determine the charge density or total charge on a surface in terms of the electric field near the surface.	
Electric Potential/Potential Difference/Electric Potential Difference/ Volts	
FIELDS AND POTENTIAL OF OTHER CHARGE DISTRIBUTION	
(A) Students should be able to use the principle of superposition to calculate by integration:	
(1) The electric field of a straight, uniformly charged wire.	
(2) The electric field and potential on the axis of a thin ring of charge, or at the center of a circular arc of charge	
(3) The electric potential on the axis of a uniformly charged disk.	
(B) Students should know the fields of highly symmetric charge distributions, so they can:	
(1) Identify situations in which the direction of the electric field produced by a charge distribution can be deduced from symmetry considerations	

(2) Describe qualitatively the patterns and variation with distance of the electric field of oppositely-charged parallel plates.	
(3) Describe qualitatively the patterns and variation with distance of the electric field of a long, uniformly-charged wire, or thin cylindrical or spherical shell.	
(4) Derive expressions for electric potential as a function of position in the above cases.	