Topic	Learning Outcomes	Time Spent	Percentage	Number of Items	Type of Test	Item Location
Electric Charge, Coulomb's Law, Electric Fields, and Electric Flux	Describe using a diagram charging by rubbing and charging by induction	0.25	0.01	1.00	Multiple Choice	1
	Explain the role of electron transfer in electrostatic charging by rubbing	0.25	0.01	1.00	True or False	21
	Describe experiments to show electrostatic charging by induction	0.25	0.01	1.00	Multiple Choice	2
	Calculate the net electric force on a point charge exerted by a system of point charges	0.25	0.01	1.00	Multiple Choice	3
	Describe an electric field as a region in which an electric charge experiences a force	0.5	0.02	1.00	Multiple Choice	4
	Calculate the electric field due to a system of point charges using Coulomb's law and the superposition principle	0.5	0.02	1.00	Multiple Choice	5
	Calculate electric flux	0.5	0.02	1.00	Multiple Choice	6
	Use Gauss's law to infer electric field due to uniformly distributed charges on long wires, spheres, and large plates	0.5	0.02	1.00	True or False	22
	Solve problems involving electric charges, dipoles, forces, fields, and flux in contexts such as, but not limited to, systems of point charges, electrical breakdown of air, charged pendulums, electrostatic ink-jet printers	1	0.04	2.00	Problem Solving	41-42
Electric Potential	Relate the electric potential with work, potential energy, and electric field	0.5	0.02	1.00	Multiple Choice	7
	Determine the electric potential function at any point due to highly symmetric continuous- charge distributions	0.5	0.02	1.00	Multiple Choice	8
	Infer the direction and strength of electric field vector, nature of the electric field sources, and electrostatic potential surfaces given the equipotential lines	1	0.04	2.00	Multiple Choice	9,10
	Calculate the electric field in the region given a mathematical function describing its potential in a region of space	1	0.04	2.00	Multiple Choice	11,12
	Solve problems involving electric potential energy and electric potentials in contexts such as, but not limited to, electron guns in CRT TV picture tubes and Van de Graaff generators	1	0.04	2.00	Problem Solving	43-44
Capacitance and Dielectrics	Deduce the effects of simple capacitors (e.g., parallel-plate, spherical, cylindrical) on the capacitance, charge, and potential difference when the size, potential difference, or charge is changed	0.5	0.02	1.00	Multiple Choice	13
	Describe the effects of inserting dielectric materials on the capacitance, charge, and electric field of a capacitor	0.5	0.02	1.00	True or False	23
	Calculate the equivalent capacitance of a network of capacitors connected in series/parallel	0.5	0.02	1.00	Problem Solving	45
	Determine the total charge, the charge on, and the potential difference across each capacitor in the network given the capacitors connected in series/parallel	0.5	0.02	1.00	Short Answer	67
	Determine the potential energy stored inside the capacitor given the geometry and the potential difference across the capacitor	1	0.04	2.00	True or False	24,25
	Solve problems involving capacitors and dielectrics in contexts such as, but not limited to, charged plates, batteries, and camera flashlamps.	1	0.04	2.00	Problem Solving	46-47
Current, Resistance, Electromotive Force, and Devices for Measuring Currents	Distinguish between conventional current and electron flow	0.25	0.01	1.00	True or False	26
	Describe the effect of temperature increase on the resistance of a metallic conductor	0.25	0.01	1.00	True or False	27
	Describe the ability of a material to conduct current in terms of resistivity and conductivity	0.25	0.01	1.00	True or False	28
	Apply the relationship charge = current x time to new situations or to solve related problems	0.25	0.01	1.00	Problem Solving	48
	Apply the relationship of the proportionality between resistance and the length and cross sectional area of a wire to solve problems	0.25	0.01	1.00	Problem Solving	49
	Differentiate ohmic and non-ohmic materials in terms of their I-V curves	0.25	0.01	1.00	True or False	29
	Differentiate emf of a source and potential difference (PD) across a circuit	0.5	0.02	1.00	True or False	30

Measuring Currents and Voltages	Given an emf source connected to a resistor, determine the power supplied or dissipated by each element in a circuit	0.5	0.02	1.00	Multiple Choice	14
	Solve problems involving current, resistivity, resistance, and Ohm's law in contexts such as, but not limited to, batteries and bulbs, household wiring, and selection of fuses.	0.5	0.02	1.00	Problem Solving	50
	Operate devices for measuring currents and voltages	0.5	0.02	1.00	True or False	31
	Draw circuit diagrams with power sources (cell or battery), switches, lamps, resistors (fixed and variable) fuses, ammeters and voltmeters	0.5	0.02	1.00	Short Answer	66
Direct-Current Circuits	Evaluate the equivalent resistance, current, and voltage in a given network of resistors connected in series and/or parallel	1	0.04	2.00	Multiple Choice	15,16
	Calculate the current and voltage through and across circuit elements using Kirchhoff's loop and junction rules (at most 2 loops only)	1	0.04	3.00	Problem Solving	51-53
	Solve problems involving the calculation of currents and potential difference in circuits consisting of batteries, resistors, and capacitors.	2	0.07	5.00	Problem Solving	54 - 58
Magnetic Fields and Magnetic Forces	Differentiate electric interactions from magnetic interactions	1	0.04	3.00	True and False	32,33,34
	Evaluate the total magnetic flux through an open surface	1	0.04	3.00	Multiple Choice	17,18,19
	Describe the motion of a charged particle in a magnetic field in terms of its speed, acceleration, cyclotron radius, cyclotron frequency, and kinetic energy	1	0.04	3.00	True or False	35,36,37
	Evaluate the magnetic force on an arbitrary wire segment placed in a uniform magnetic field	1	0.04	3.00	Essay	68-70
Sources of Magnetic Fields (Biot-Savart and Ampere's Law)	Evaluate the magnetic field vector at a given point in space due to a moving point charge, an infinitesimal current element, or a straight current-carrying conductor	0.5	0.02	1.00	Multiple Choice	20
	Calculate the magnetic field due to one or more straight wire conductors using the superposition principle	0.5	0.02	1.00	Problem Solving	59
	Calculate the force per unit length on a current carrying wire due to the magnetic field produced by other current-carrying wires	1	0.04	3.00	Problem Solving	60-62
	Evaluate the magnetic field vector at any point along the axis of a circular current loop	1	0.04	3.00	True or False	38,39,40
	Solve problems involving magnetic fields, forces due to magnetic fields and the motion of charges and current-carrying wires in contexts such as, but not limited to, determining the strength of Earth's magnetic field, mass spectrometers, and solenoids.	1	0.04	3.00	Problem Solving	63-65
	TOTAL	28	1.00	70		