CfE

Advanced Higher

Unit 3 Electromagnetism

Learning Outcomes

Name_____ Teacher_____

✓	**I am confident that I understand this and I can apply this to problems**
?	**I have some understanding but I need to revise this some more**
✘	**I don't know this or I need help because I don't understand it**

Electric fields and Coulomb's law	Covered (✓)	How well can you do this?
1. I can state that an electric field is the space that surrounds electrically charged particles and in which a force is exerted on other electrically charged particles		✘ ? ✓
2. I can state that electric field strength at any point is the force per unit positive charge placed at that point.		✘ ? ✓
3. I can state that the units of electric field strength are newton per coulomb.		✘ ? ✓
4. I can state Coulomb's law as follows: The force between two point charges is directly proportional to the product of the charges divided by the square of their distances apart.		✘ ? ✓

	Covered (✓)	How well can you do this?
5. I can carry out calculations involving Coulomb's law for the electrostatic force between point charges.		✗ ? ✓
6. I can describe how the concept of an electric field is used to explain the forces that charged particles at rest exert on each other.		✗ ? ✓
7. I can carry out calculations involving the electric fields due to point charges.		✗ ? ✓
8. I can derive the expression V = Ed for a uniform electric field.		✗ ? ✓
9. I can carry out calculations involving uniform electric fields.		✗ ? ✓

	Covered (✓)	How well can you do this?
10. I can state that the force a unit charge experiences when moving in a uniform electric field is constant.		✗ ? ✓
11. I can define potential difference as the work done in moving a charge Q across the field through a distance d.		✗ ? ✓
12. I can define electrostatic potential at a point P a distance r from a charge Q, as the work done by external forces in bringing a positive test charge Q_t from infinity to a point P.		✗ ? ✓
13. I can carry out calculations involving potentials due to point charges.		✗ ? ✓
14. I can describe the energy transformations associated with the movement of a charge in an electric field.		✗ ? ✓
15. I can describe the motion of charged particles in uniform electric fields		✗ ? ✓

	Covered (✓)	How well can you do this?
16. I can carry out calculations concerning the motion of charged particles in uniform electric fields.		✗ ? ✓
17. I can state that the electronvolt is the energy acquired when one electron accelerates through a potential difference of one volt.		✗ ? ✓
18. I can state that the electronvolt is a unit of energy..		
19. I can state that the energy acquired when an electron accelerates through a potential difference of one volt is changed from electrical energy to kinetic energy.		✗ ? ✓
Magnetic fields and magnetic induction	Covered (✓)	How well can you do this?
20. I can state that in addition to its electric field a magnetic field also exists round a moving charge.		✗ ? ✓
21. I can state that a charged particle moving across a magnetic field experiences a force.		✗ ? ✓

	Covered (✓)	How well can you do this?
22. I can state that magnetic induction is the force on a conductor placed in a magnetic field.		✗ ? ✓
23. I can state that the unit of magnetic induction is Tesla (T).		✗ ? ✓

	Covered (✓)	How well can you do this?
24. I can state that the symbol for magnetic induction is B.		✗ ? ✓
25. I can describe how the concept of a magnetic field is used to explain the magnetic force exerted by current carrying conductors on each other.		✗ ? ✓
26. I can state that one Tesla is the magnetic induction of a magnetic field in which a conductor of length one metre, carrying a current of one ampere perpendicular to the field is acted on by a force of one newton.		✗ ? ✓

27. I can carry out calculations involving current carrying conductors in magnetic fields.		✘ ? ✓
28. I can carry out calculations involving the magnetic fields around infinite straight current carrying conductors.		✘ ? ✓
29. I can derive the expression $\frac{F}{l} = \frac{\mu_0 I_1 I_2}{2\pi r}$ For the force per unit length between two parallel current carrying wires a distance r apart.		✘ ? ✓
Circuits - Capacitors	Covered (✓)	How well can you do this?
30. I can define decay time for a RC circuit.		✘ ? ✓
31. I can carry out calculations involving decay time for a RC circuit.		✘ ? ✓
32. I can determine the time constant for a RC circuit.		✘ ? ✓

33. I can state the relationships between current and voltage; current and frequency and current and capacitance in a CR (ac) circuit and use these to establish that capacitive reactance (X_C) = 1 ÷ (2πfC)		✗ ? ✓
34. I can state that the unit of capacitive reactance is the ohm.	Covered (✓)	How well can you do this?
		✗ ? ✓
35. I can state some of the uses of capacitors.		✗ ? ✓
Circuits - Inductors	Covered (✓)	How well can you do this?
36. I can sketch qualitative graphs of the growth and decay of current in a d.c. circuit containing an inductor		✗ ? ✓

37. I can describe the principles of a method to illustrate the growth of current in a d.c. circuit.		✗ ? ✓
38. I can state that an e.m.f. is induced across a coil when the current through the coil is varying.		✗ ? ✓
39. I can explain the production of the induced e.m.f. across a coil.		✗ ? ✓

40. I can state that the inductance of an inductor is one henry if an e.m.f. of one volt is induced when the current changes at a rate of one ampere per second.		✗ ? ✓
41. I can carry out calculations involving the relationship between self-induced e.m.f. in a coil, self inductance and the rate of change of current.		✗ ? ✓
42. I can explain that the work done in building up the current in an inductor is stored in the magnetic field of the inductor.		✗ ? ✓

43. I can explain that the energy stored in the magnetic field of an inductor may be a source of e.m.f.		✗ ? ✓
44. I can carry out calculations involving the relationship between energy stored in an inductor, self inductance and current.		✗ ? ✓
45. I can describe the principles of a method to show how the current varies with frequency in an inductive circuit.		✗ ? ✓
46. I can describe and explain the possible functions of an inductor - sources of high e.m.f., blocking a.c. signals while transmitting d.c. signals.		✗ ? ✓
47. I can compare the dependence on frequency of the capacitive and inductive reactances.		✗ ? ✓

Electromagnetic Radiation	Covered (✓)	How well can you do this?
48. I can state that electromagnetic radiation exhibits wave like properties as it transfers energy through space.		✘ ? ✓
49. I can state that the electric field and the magnetic field oscillate in phase and are at right angles to each other and to the direction of travel.		✘ ? ✓
50. I can describe experiments to estimate the speed of light by determining permittivity using a parallel plate capacitor and permeability using a current balance.		✘ ? ✓
		✘ ? ✓
	Covered (✓)	How well can you do this?
		✘ ? ✓