8. Electric Charges, Fields, and Gauss's Law

Weeks 1–6

电荷、电场与高斯定律

They should be able to

1. Describe the electric force that results from the interactions between charged objects or systems.
2. Describe the electric and gravitational forces that result from interactions between charged objects with mass.
3. Describe the electric permittivity of a material or medium.
4. Describe the behavior of a system using conservation of charge.
5. Describe the electric field produced by a charged object or configuration of point charges.
6. Describe the electric field generated by charged conductors or insulators.
7. Describe the electric field resulting from a given charge distribution.
8. Describe the electric flux through an arbitrary area or geometric shape.
9. Describe the properties of a charge distribution by applying Gauss's law.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 08 (10 questions, answers on sheet 2)	
Teach the new content	Handout 08 Slide deck 08 Vocabulary list 08	
Practice guided then independent	Exercise sheets 8.1, 8.2, 8.3, 8.4, 8.5, 8.6 Past-paper sheets 8.1, 8.2, 8.3, 8.4, 8.5, 8.6	
Check before they leave	Unit test 8 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

9. Electric Potential

Weeks 7–9

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They should be able to

1. Describe the electric potential energy of a system.
2. Describe the electric potential due to a configuration of charged objects.
3. Describe the relationship between electric potential and electric field.
4. Describe changes in a system due to a difference in electric potential between two locations.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 09 (10 questions, answers on sheet 2)	
Teach the new content	Handout 09 Slide deck 09 Vocabulary list 09	
Practice guided then independent	Exercise sheets 9.1, 9.2, 9.3 Past-paper sheets 9.1, 9.2, 9.3	
Check before they leave	Unit test 9 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

10. Conductors and Capacitors

Weeks 10–12

导体与电容器

They should be able to

1. Describe the charge distribution within a conductor.
2. Describe the movement of charge and the resulting interactions when conductors physically contact each other.
3. Describe the physical properties of a parallel-plate capacitor.
4. Describe how a dielectric inserted between the plates of a capacitor changes the properties of the capacitor.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 10 (10 questions, answers on sheet 2)	
Teach the new content	Handout 10 Slide deck 10 Vocabulary list 10	
Practice guided then independent	Exercise sheets 10.1, 10.2, 10.3, 10.4 Past-paper sheets 10.1, 10.2, 10.3, 10.4	
Check before they leave	Unit test 10 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

11. Electric Circuits

Weeks 13–20

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They should be able to

1. Describe the movement of electric charges through a medium.
2. Describe the behavior of a circuit.
3. Describe the resistance of an object using physical properties of that object.
4. Describe the electrical characteristics of elements of a circuit.
5. Describe the transfer of energy into, out of, or within an electric circuit, in terms of power.
6. Describe the equivalent resistance of multiple resistors connected in a circuit.
7. Describe a circuit with resistive wires and a battery with internal resistance.
8. Describe the measurement of current and potential difference in a circuit.
9. Describe a circuit or elements of a circuit by applying Kirchhoff's loop rule.
10. Describe a circuit or elements of a circuit by applying Kirchhoff's junction rule.
11. Describe the equivalent capacitance of multiple capacitors.
12. Describe the behavior of a circuit containing combinations of resistors and capacitors.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 11 (10 questions, answers on sheet 2)	
Teach the new content	Handout 11 Slide deck 11 Vocabulary list 11	
Practice guided then independent	Exercise sheets 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8 Past-paper sheets 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8	
Check before they leave	Unit test 11 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

12. Magnetic Fields and Electromagnetism

Weeks 21–24

磁场与电磁学

They should be able to

1. Describe the properties of a magnetic field.
2. Describe the magnetic behavior of a material as a result of the configuration of magnetic dipoles in the material.
3. Describe the magnetic permeability of a material.
4. Describe the magnetic field produced by moving charged objects.
5. Describe the force exerted on moving charged objects by a magnetic field.
6. Describe the magnetic field produced by a current-carrying wire.
7. Describe the force exerted on current-carrying wires by a magnetic field.
8. Use Ampère's law to describe the magnetic field created by a moving charge carrier.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 12 (10 questions, answers on sheet 2)	
Teach the new content	Handout 12 Slide deck 12 Vocabulary list 12	
Practice guided then independent	Exercise sheets 12.1, 12.2, 12.3, 12.4 Past-paper sheets 12.1, 12.2, 12.3, 12.4	
Check before they leave	Unit test 12 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

13. Electromagnetic Induction

Weeks 25–30

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They should be able to

1. Describe the magnetic flux through an arbitrary area or geometric shape.
2. Describe the induced electric potential difference resulting from a change in magnetic flux.
3. Describe the force exerted on a conductor due to the interaction between an external magnetic field and an induced current within that conductor.
4. Describe the physical and electrical properties of an inductor.
5. Describe the physical and electrical properties of a circuit containing a combination of resistors and a single inductor.
6. Describe the physical and electrical properties of a circuit containing a combination of capacitors and a single inductor.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 13 (10 questions, answers on sheet 2)	
Teach the new content	Handout 13 Slide deck 13 Vocabulary list 13	
Practice guided then independent	Exercise sheets 13.1, 13.2, 13.3, 13.4, 13.5, 13.6 Past-paper sheets 13.1, 13.2, 13.3, 13.4, 13.5	
Check before they leave	Unit test 13 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	