

getting the physics straight

electrical flow starts simultaneously everywhere in the loop

adding resistance in series or parallel has different effects

energy and power used as a limiting model

remote working—electrical and mechanical

energy filling stores as a result of the accumulation of power in pathways

devices switch power from one pathway to other pathways

representing the topic effectively

current in electrical loops as a result of choices in assembling the circuit

energy is found in stores; power in pathways

using a few coherent models well

magnetic fields as representations to reason with—to predict forces

electrical loops

particular teaching challenges

correct use of technical terms

reasoning with students, rather than relying on rules-of-thumb

avoiding 'electrical energy' in dynamic situations such as resistive

a coherent model of power and energy

reinforcing correct and helpful ways of thinking about electrical circuits

using a consistent and coherent energy-based description of

using a consistent and coherent power-based description of

the meaning of ratings on everyday devices

dealing with existing ideas

sequential reasoning about energy in circuits

sequential reasoning about current and voltage in circuits

energy chains in reasoning

conflating electrical and magnetic loops in electromagnetic devices

selected teaching principles

systematic use of teaching models

analysing circuits as systems

circuits are intelligible: you can reason about them from simple

reasoning about dynamic equilibrium

electromagnetic induction linked to other processes

respecting the quantitative nature of energy

using a consistent and coherent energy-based description of