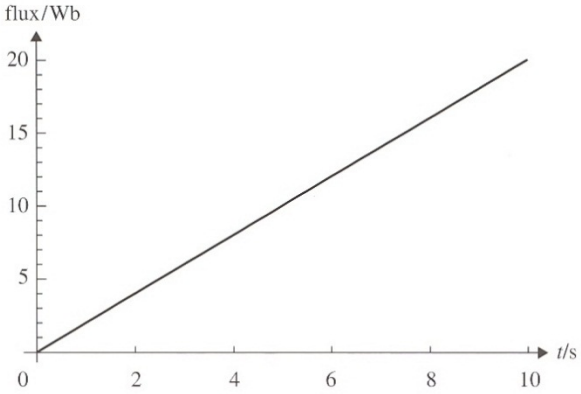
Electromagnetic Induction Worksheet

1. A uniform magnetic field has a magnitude of 0.078 T. Calculate the magnetic flux through a loop of wire of radius 0.10 m at an angle of 25° to the field. (2.2×10^{-3} Wb)

2. The flux through a loop as a function of time is given by the graph.

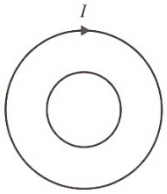


Make a sketch of the emf induced in the loop as a function of time.

3. A circular coil of 950 turns and a radius of 0.060 m is rotating in a uniform magnetic field of 8.56×10^{-5} T. The coil rotates from an angle of 0° to 45° in 0.10 s. Calculate the magnitude of the induced emf in the coil. (2.7×10^{-3} V)

4. A coil of 1000 turns has a smaller coil of diameter 2.0 cm and 200 turns inserted inside it. The current in the big coil is changing causing the magnetic field in the coil to change at a rate of 0.94 T/s, calculate the emf induced in the smaller coil. (5.9×10^{-2} V)

5. The figure shows a top view of two solenoids with their axes parallel, one with a smaller diameter so that it fits inside the other. If the bigger solenoid has a current flowing in the clockwise direction (looked at from above) and the current is increasing in magnitude, find the direction of the induced current in the smaller solenoid.



6. What is the direction of the induced current through resistor R in the drawing as the current I increases? Explain your answer.