Chapter 14

Q8 Yes. With the current in the wire along a north to south direction the compass needle will be deflected away from north. The actual direction of deflection (toward the east or west) will depend on whether the current flows north or south.

Q10 The wires carrying a current are electrically neutral and therefore there is no electrostatic effect. The force of one current-carrying wire on another is a magnetic effect.

Q14 The direction of a current is defined as the direction of the motion of a positive charge carrier. (When this definition was originally devised it had not yet been determined that charge carriers in a typical wire were actually negative electrons.)

Q22 A steady state current will not induce a current in the secondary regardless of the number of turns. Only when the flux through the secondary coil is changing is there an induced current.

Q25 A certain voltage is induced for each turn, so the overall voltage is proportional to the number of turns since they are all in series. The coil with twice as many turns will have twice the induced voltage.

E3 \( F_2 = \frac{1}{3} F_1 \)

E6 18 N

E9 1.92 T\( \cdot \)m\(^2\)

E11 24 V

E13 a. Step up
   b. 440 V

SP2 a. 5 N
   b. Upwards, perpendicular to both the direction of motion and the direction of the magnetic field.
   c. No. The force will impart a change of direction only.
   d. 200 m/s\(^2\)
   e. 200 m

SP3 a. 0.0018 m\(^2\)
   b. 0.043 T\( \cdot \)m\(^2\)
   c. Zero
   d. 0.25 s
   e. 0.1728 V