1. D Only the component of a charged particle's velocity *perpendicular* to a magnetic field will produce a magnetic force.

2.* A The magnitude of the magnetic force is found:

$$F = qvB \sin\ \theta$$

$$= \left(1.6 \times 10^{-19}\,\mathrm{C}\right)\left(2 \times 10^{6}\,\frac{\mathrm{m}}{\mathrm{s}}\right)\left(300\ \mathrm{T}\right)\left(\frac{1}{2}\right)$$

The version of the right-hand-rule to use here: Point the fingers of your right hand in the direction of the field lines; align your thumb with the motion of the *positive* charge. From the palm of your hand extends the vector *perpendicular to both the field and the charge velocity* representing the magnetic force.

3. A Use two right hand rules here: one to gain perspective on the field of one of the wires, the second right hand rule to predict the force exerted by that field on the second wire.
1) Point your right thumb in the direction of the current. Wrap your fingers circularly around the wire to follow the concentric field lines.
2) Now that you have the direction of the field of wire #1. Point your right hand fingers to represent the field lines and your thumb to represent the current. The force is a vector from the palm of your hand.

4. B Even though the net force on the loop is zero, there is a net torque, which will rotate the loop clockwise when viewed from the bottom end.

5. D All are true and also significant.

6. A Using right hand rule (1) from question #3 above will get you to the correct field.

7. C Electromagnetic induction is the process by which a change in magnetic flux (field lines through a current loop) produces an e.m.f. (called back e.m.f.) that works to sustain the current that produced the original flux. The induced e.m.f. is in such a direction as to oppose the change that produced it.

8. C In electrostatics, we store energy in the electric field by increasing the separation of mutually attracting charges (+ and -) or by bringing like charges closer together. That is electrostatic potential energy. In electromagnetic circuits, we see that a magnetic field can also store energy. It does so in this context in the relationship between magnetic flux and the current which produces it. If the current begins to drop, the magnetic field willexpend stored energy in maintaining the current at the original value.