Question 32.1
A coil of wire always has an inherant inductance value, just as a capacitor always has a capacitance, even if the inductor isn't affecting in the circuit; the value is dependent only on the geometry of the coil. That said, once the current reaches its max value, the inductor is no longer producing any emf or affecting the current value.

Question 32.7
Since the circuit runs for a long time before the switch is moved to b, the current in the circuit will be the steady state values given by Ohm's law (i.e. with no effect from the inductor); at this point, the potential across the 12Ω resistor is very nearly 12V. After the switch is thrown, the "inertia" of the inductor will maintain the current value momentarily as the current begins to exponentially decay. Therefore, right after the switch is closed, the value of $V_{12\Omega}$ is the same as it was before the switch was thrown, but the value of $V_{1200\Omega}$ is, again by Ohm's law, much larger. The potential across the inductor at this point will be equal to that of $V_{R_{eq}}$, which means it will be the sum of the others; therefore it is the largest out of all of them. So we have $V_L > V_{1200\Omega} > \varepsilon > V_{12\Omega}$.

Question 32.9
The B-field of the wire runs in the $\hat{\phi}$-direction, meaning it runs in circles around the wire; therefore, to maximize flux, you would want the coil to lie in a single plane with the wire, like a net catching the lines as they go around, or **answer (c)**. There would be no flux from statement (a) because the field lines are parallel to the loop, and no flux from statement (b) because whatever lines go in through the loop would curve back out. Since the field is strongest near the wire, a rectangular shape with the long sides parallel to the wire would maximize effectiveness.

Question 32.12
Since $L \sim N^2$, cutting the number of turns in half would decrease L by a factor of 4. Since $U = \frac{1}{2}LI^2$, doubling the current would *increase* U by a factor of 4, compensating for the drop in L from halving N; therefore, **answer(b)** is correct.

Question 34.4
The beauty of electromagnetic waves is that no medium is required. The values of the fields themselves at each point are doing the actual oscillating, and it's pure energy that is being transported. On a deeper level in terms of the physics involved, the energy is actually carried by massless, wave-like particles called photons, which can be thought of as little packets of EM energy. The particles behave quantum-mechanically, and have energy given by $E = hf$, meaning the energy is frequency dependent (a commonplace example is that blue light is more energetic than red light; that's why LED's on most objects are red...they require the least energy, so they're cheapest). All of this is covered in the part of the class we aren't getting to haha. Feel free to check it out on your own in the book, or ask me, or at least watch some PBS or Discovery channel.

Question 34.5
The varying B-field set up inside the coil is transferring energy to the core via eddy currents and the core's own intrinsic resistance by $P = I^2R$.

Question 34.7
Because of the second derivatives in the EM wave equations, you need *acceleration* of charge or *changes* in E- and/or B-fields to produce electromagnet waves; therefore, **answer (e)** is correct.

Question 34.8
(i) The energy of the wave is set and locked by its source until some other interaction occurs, so its frequecy stays constant (c). (ii) frequency and wavelength are inversely proportional to each other via the wave speed, which is the speed of light, c, which is constant, so the wavelength is also, of course, constant (c). (iii) As I just said, the wave speed is the speed of light, c, which is always and forever constant (especially in a

vacuum), so the answer is still (c). (iv) The same fields must constantly spread out into more space as the wave propagates; same energy over a bigger area means the intensity will decrease (b). (v) Similarly, the amplitude of the fields will decrease as the wave spreads out (b). This is why radio stations and cell phone towers only work for so much distance.