Name Date

PH 102 Quiz 6: So you say you read the exam solutions ...

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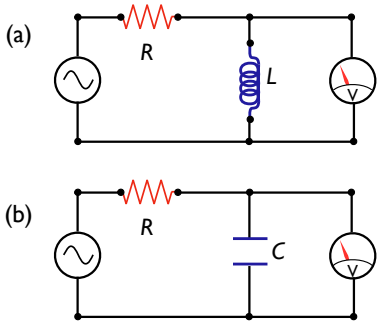

1. A variable-frequency ac voltage source (circles with sine waves inside) is hooked up to **(a)** a resistor R and an inductor L, and **(b)** a resistor R and a capacitor C. The resistor is the same in both cases. A voltmeter monitors the voltage on the inductor in circuit **(a)**, and on the capacitor in circuit **(b)**.

Which of the following is true?

- ◯ The voltmeter in **(a)** reads low frequencies preferentially, the voltmeter in **(b)** reads high frequencies preferentially.
- ◯ The voltmeter in **(b)** reads low frequencies preferentially, the voltmeter in **(a)** reads high frequencies preferentially.
- ◯ Both voltmeters read low frequencies preferentially
- ◯ Both voltmeters read high frequencies preferentially

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2. During an in-class demonstration, we dropped a magnet and a non-magnet of equal weight and size through a copper tube. The non-magnet fell through the tube at the expected rate, but the non-magnet took many times longer to fall out, due to eddy current braking.

Is it possible to have a magnet strong enough (or a tube conductive enough, *etc*) that it would actually *stop* inside the tube?

- ◯ Yes, provided the tube is conducting enough to carry strong eddy currents.
- ◯ No, eddy current braking can only balance the force of gravity
- ◯ No, eddy current braking only occurs when the magnet is in motion.
- ◯ Yes, provided the magnet is strong enough that its magnetic field can counter its own weight.

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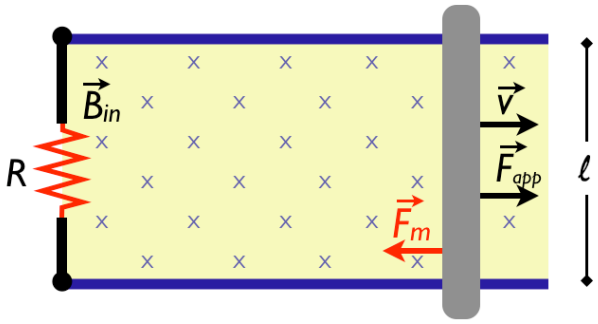
3. A conducting rod of length l moves on two (frictionless) horizontal rails, as shown to the right. A constant force of magnitude $|\vec{\mathbf{F}}_{\text{app}}| = 1.0\,\text{N}$ moves the bar at a uniform speed of $|\vec{\mathbf{v}}| = 2.0\,\text{m/s}$ through a magnetic field $\vec{\mathbf{B}}$ directed into the page. The resistor has a value $R = 8.0\,\Omega$.



What is the power dissipated in the resistor?

- ◯ 1.0 W
- ◯ 2.0 W
- ◯ 3.0 W

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4. The Sun delivers an average power ($\mathscr{P}$) per unit area of about $\mathcal{I} \equiv \mathscr{P}/A = 1.00 \times 10^3\,\text{W/m}^2$ to Earth's surface. What is the total power incident on a flat roof 7.17 m by 21.1 m? The radiation is incident normal to the roof.

- ◯ 3×10^6 W
- ◯ 6×10^4 W
- ◯ 1.5×10^3 W
- ◯ 1.5×10^5 W

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5. Do you need to know the value of the resistor in question 3?

- ◯ yes
- ◯ no