

WebAssign**CH24-HW03-FALL2010 (Homework)**

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PHYS 272-FALL 2012, Fall 2012
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Current Score : 18 / 18 **Due :** Friday, December 7 2012 11:59 PM EST

1. 2/2 points | [Previous Answers](#)

MI3 24.4.X.038

A particular AM radio station broadcasts at a frequency of 1040 kilohertz. What is the wavelength of this electromagnetic radiation?

 m

How much time is required for the radiation to propagate from the broadcasting antenna to a radio 5 km away?

 s


- [Read the eBook](#)
- [Section 24.4](#)

2. 1/1 points | [Previous Answers](#)

MI3 24.4.X.038.01

Radiation

Which of the following are true for sinusoidal radiation?

- ☒ The radiation travels perpendicular to the electric field.
☐ The electric field and the magnetic field have the same magnitude at the same point in space.
☒ The source of the radiation is oscillating charges.
☐ The radiation pattern does not change with time.
☒ The propagation direction of the radiation can be determined from the right hand rule.
☒ The radiation travels perpendicular to the magnetic field.
☐ The radiation pattern does not change with distance.
☐ Oscillating charges are not accelerating.
☒ The electric field is perpendicular to the magnetic field.
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- [Read the eBook](#)
- [Section 24.4](#)

3. 2/2 points | [Previous Answers](#)

MI3 24.4.X.039

The wavelength of orange light is about 600 nm (1 nanometer = 1×10^{-9} m). What are the frequency and period of the light waves?

$$f = \boxed{5\text{e}14} \checkmark \text{ s}^{-1}$$

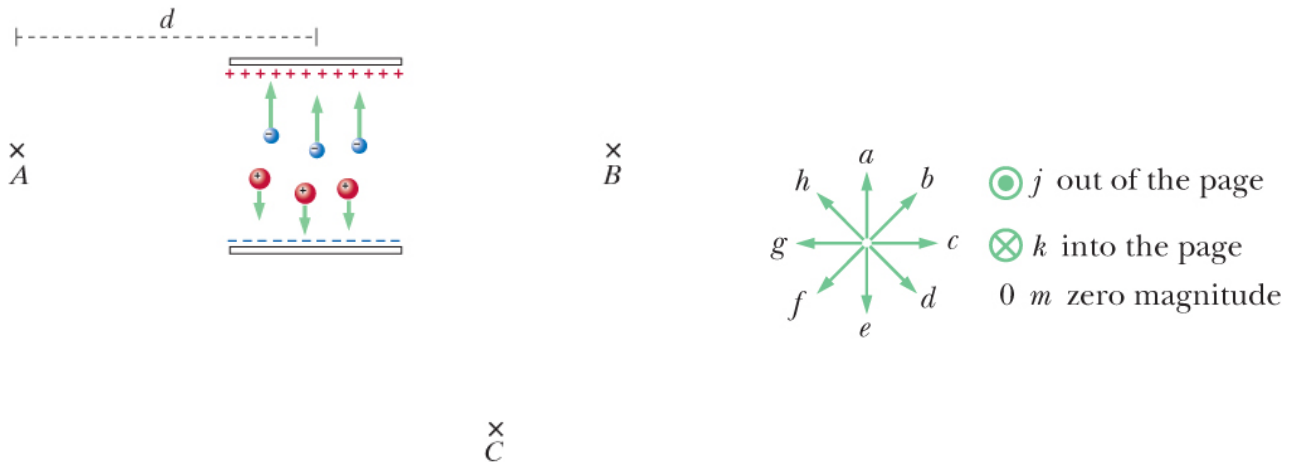
$$T = \boxed{2\text{e}-15} \checkmark \text{ s}$$

- [Read the eBook](#)
- [Section 24.4](#)

4. 7/7 points | [Previous Answers](#)

MI3 24.3.X.036

(a) If the electric field inside a capacitor exceeds about 3×10^6 V/m, the few free electrons in the air are accelerated enough to trigger an avalanche and make a spark. In the spark shown in the diagram, electrons are accelerated upward and positive ions are accelerated downward.



Which arrow best indicates the direction of propagation of electromagnetic radiation reaching location A?

✓

Which arrow best indicates the direction of propagation of electromagnetic radiation reaching location C?

✓

What is the direction of the radiative electric field observed at location A?

✓

What is the direction of the radiative electric field observed at location C?

✓

What is the direction of the radiative magnetic field observed at location A?

✓

What is the direction of the radiative magnetic field observed at location C?

✓

If you are at location A, $d = 4$ meters to the left of the capacitor, how long after the initiation of the spark could you first detect a magnetic field?

✓ seconds

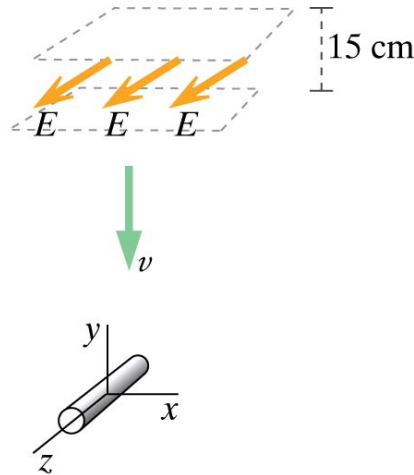
- [Read the eBook](#)
- [Section 24.3](#)

5. 6/6 points | [Previous Answers](#)

MI3 24.5.P.043

Radiation and a copper wire

A slab (pulse) of electromagnetic radiation that is $h = 15$ cm thick is propagating downward (in the $-y$ direction) toward a short horizontal copper wire located at the origin and oriented parallel to the z axis, as shown in the figure.



(a) The direction of the electric field inside the slab is out of the page (in the $+z$ direction). What is the direction of the magnetic field inside the slab?

✓

(b) You stand on the x axis at location $\langle 12, 0, 0 \rangle$ m, at right angles to the direction of propagation of the pulse. Your friend stands on the z axis at location $\langle 0, 0, 12 \rangle$ m. The pulse passes the copper wire at time $t_1 = 0$, and at a later time t_2 you observe new non-zero electric and magnetic fields at your location. What is t_2 ? (give a numerical answer.)

✓ s

(c) What is the direction of the new electric field at your location?

✓

(d) What is the direction of the new magnetic field at your location?

✓

(e) What is the direction of the new electric field at your friend's location?

✓

(f) What is the direction of the new magnetic field at your friend's location?

✓

- [Read the eBook](#)
- [Section 24.5](#)