Final Exam Help

Review Sessions:
Sun, June 3, at 2:00 pm in 1009 Smith
Mon, June 4, at 5:30 pm in 1009 Smith

“Drop In” session for last minute questions:
Tues, June 5, 11:30 - 1:15 in 2005 Smith

Final Exam:
Tues, June 5, 1:30 in 1000 McPherson

Solutions to activity sheets and exercises and copies of overheads are available
♦ on the webpage:
  www.physics.ohio-state.edu/~ntg/p103
♦ on reserve at the Science and Engineering Library. Vol III covers Periods 13 - 18
Preview of Period 18:
Information Transfer

18.1 Loudspeakers and Microphones

How do microphones and loudspeakers work?

How are microphones and loudspeakers similar? How are they different?

18.2 Information Transfer

How is radiant energy used to transfer information?
Act. 18.1:
Loudspeakers and Microphones

A loudspeaker converts electrical energy into sound energy.

♦ A changing current induces a changing magnetic field around its wire.

♦ The changing magnetic field attracts and repels a magnet attached to the cone of the speaker.

♦ The magnet moves the speaker cone, which produces the sound waves from the speaker.

A microphone converts sound energy into electrical energy.

♦ Pressure from sound waves moves a magnet inside the microphone.

♦ The moving magnet creates a changing magnetic field.

♦ The changing magnetic field induces a changing electric current.
Act.18.1: Building a Speaker

Follow the directions to build a loudspeaker.

What is the purpose of wrapping wire around the bolt?

How many magnets does the speaker have?

What makes the speaker cone (the foil pan) move?
Information Transfer with Radiant Energy

♦ Information can be transferred with waves of radiant energy (electromagnetic energy).

♦ Radiant energy waves can travel through a medium, such as air or water, or through the vacuum of empty space.

♦ Radiant energy is transferred by waves of different lengths. Shorter wavelengths transfer more energy.

<table>
<thead>
<tr>
<th>Wave Length</th>
<th>Wave Length</th>
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<tbody>
<tr>
<td>Longer</td>
<td>Shorter</td>
</tr>
<tr>
<td>Transfers</td>
<td>Transfers</td>
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<tr>
<td>Less Energy</td>
<td>More Energy</td>
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</tbody>
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♦ Long radio waves are used to broadcast radio signals.

♦ Shorter microwaves are used for communication and in microwave ovens.

♦ Visible light waves are even shorter.
Period 18 Summary

18.1: Some transfers of energy and information involve the transfer of matter such as current flowing through an electric circuit.

Changing, or modulating, energy in a meaningful way transfers information as well as energy.

A microphone converts sound energy into electromagnetic energy.

♦ A magnet moves near an electromagnet (solenoid).

♦ The changing magnetic field of the magnet induces a changing current in the electromagnet.

A loudspeaker converts electromagnetic energy into sound energy.

♦ Changing current in an electromagnet moves a magnet attached to the speaker cone.
Period 18 Summary, Continued

18.2: Radiant energy transfers energy without transferring matter.

♦ Radio waves, microwaves, infrared radiation, and visible light, are types of radiant energy.

♦ Modulating radiant energy allows information to be transferred without a transfer of matter.
Period 18 Review Questions

R.1 How does a microphone transfer information using induced current and magnetism?

R.2 How are a loudspeaker and a microphone similar? How are they different?

R.3 What was the purpose of the wire wrapped around the bolt in the loudspeaker we built in class?

R.4 Describe one difference between information transferring using electrical energy and using radiant energy. Give examples of each type of information transfer.