Overview

In this unit your students should:

- learn how to calculate voltage gain
- understand the meaning of the terms linear, gain and distortion for amplifiers
- meet an electret microphone

This should not require more than 3 hours of class time.

Hour	Suggested Activity
1	Introduce the idea of voltage gain for an amplifier. Get students started on the **Investigating a microphone** practical. Ask students to study **6.1** from the text book before the next session.
2	Require students to answer all of the questions of the **Amplifiers** exercises. As they finish, let them start the **Voltage gain** practical. Only a minority of candidates are likely to get beyond step 2 in the time available. Ask students to answer question 1 on page 97 of the text book before the next session.
3	Let students finish the **Voltage gain** practical. As they finish, let them answer question 2 on page 97 of the text book. Ask students to study **6.2** from the text book before the next session.

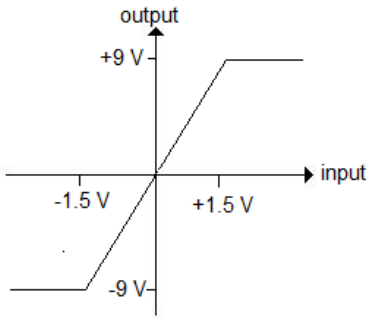
Model Answers

1 (a) An amplifier increases the amplitude of an a.c. signal without altering its shape.

(b) $V_{out} = GV_{in} = 6 \times 0.5 = 3.0$ V. The frequency is unchanged at 340 Hz.

(c)

(d) An input of 1.5 V results in an output of $6 \times 1.5 = 9$ V. Since the output voltage cannot go higher than the top supply rail voltage, input signals above 1.5 V result in a 9 V output. So signals with amplitudes above 1.5 V will be distorted at the output, with the top and bottom of their waveforms flattened.



2 (a) The circuit transfers information about sound waves into a.c. signals.

(b) $V = IR = 20 \times 10^{-6} \times 5 \times 10^{3} = 1.0 \times 10^{-1}$ V or 100 mV

(c) The capacitor blocks the 6 V bias voltage across the microphone, but allows the a.c. signal across the resistor to get to the output.

(d) $T = 1/f = 1/2.5 \times 10^{3} = 4.0 \times 10^{-4}$ s