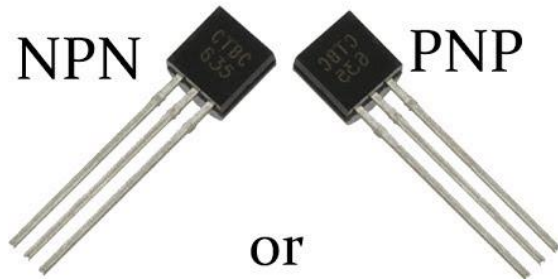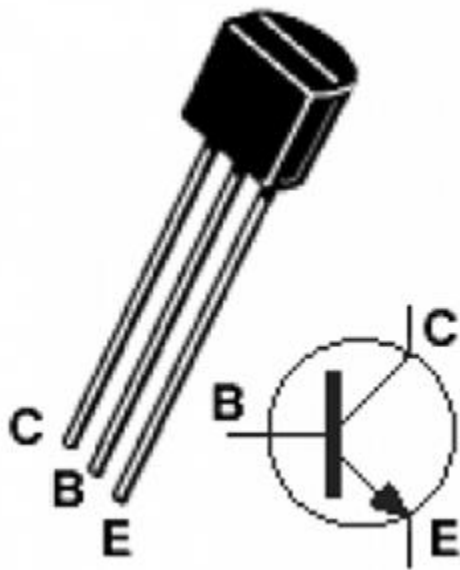# EN-3212 Electronics Worksheet 7

NPN Transistors

It's time to discuss a solid-state device called a transistor.

We're going to focus on the NPN transistor in this class. The figure below should help you identify the circuit component in lab as well as help you identify the Base (B), Collector (C), and Emitter (E) both on the physical device and in the circuit diagrams.

There are a couple of ways to use a transistor that are of interest to us. The first way is as an on and off switch. The second is in the linear mode. We'll explore both of these by way of important examples.

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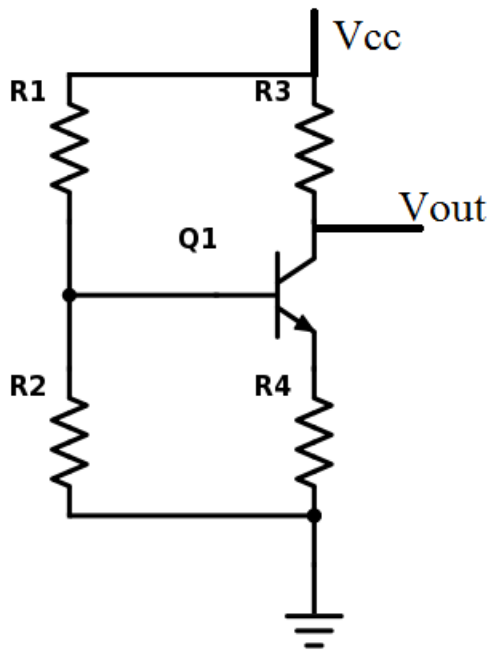
NPN Transistors

First, let's look at how it can be used in the linear mode. The circuit below is called a Class A Amplifier. Before we walk through how it works, we should get a few definitions down.
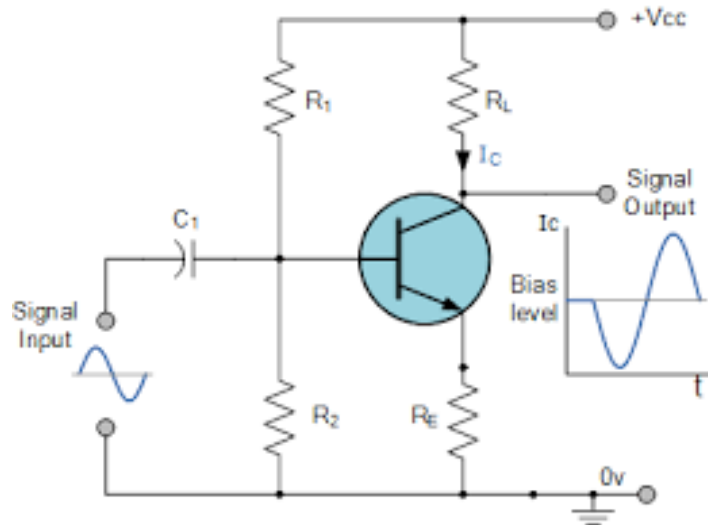
Bias Voltage:

Threshold Voltage:

Gain:

Now follow along with the derivation. Be sure to write down any assumptions we make.

Now let's see what happens if we attach a source.

We'll talk more about the time varying input later. For the time being, it's more important to focus on how the input and the output are related to one another and what we mean by gain in this context.

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NPN Transistors