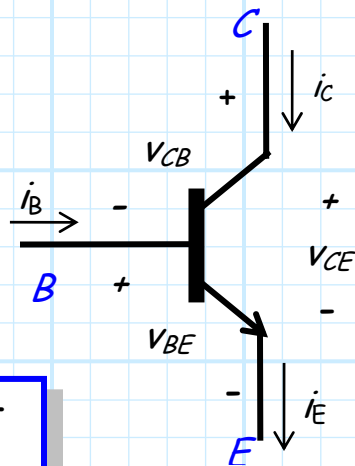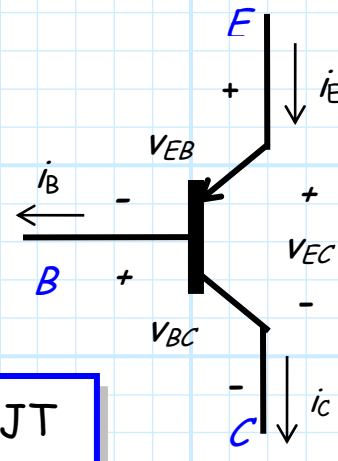# BJT Symbols and Conventions



**npn** BJT Circuit Symbol

**pnp** BJT Circuit Symbol

From KCL **only** we find:

$$i_E = i_B + i_C$$

From KVL **only** we find:

$$v_{CE} = v_{CB} + v_{BE} \quad (npn)$$

$$v_{EC} = v_{EB} + v_{BC} \quad (pnp)$$

Note that:

\* The circuit **symbols** are very **similar** to MOSFETs, with *npn* like N-MOS and *pnp* like P-MOS.

\* Positive **current** is defined in **opposite** directions for *npn* and for *pnp* (just like N-MOS and PMOS!).

\* The **voltages** are of **opposite** polarity for *npn* and *pnp*. Specifically, for *npn* we use $v_{BE}$, $v_{CE}$ and $v_{CB}$, whereas for *pnp* we use $v_{EB}$, $v_{EC}$ and $v_{BC}$. This convention typically results in **positive** voltage values for **both** *npn* and *pnp* (**unlike** the MOSFET convention!).

\* The **base current** $i_B$ is **not** equal to zero, therefore $i_E \neq i_C$ (unlike MOSFETS)!