VEB: $E-B$ junction is forward biased
VCE: $C-B$ junction is reverse biased

$I_E = I_B + I_C$

There is $180^\circ$ difference between the phase of $V_{BE}$ and $V_{CE}$, so voltage gain is negative.
a) Base voltage is supplied using voltage divider resistors $R_1$ and $R_2$. $V_B$ is constant. Only one DC source, $V_{CC}$, is used (advantage). In terms of thermal stability of $I_C$, $R_E$ resistor is used. When $I_C$ increases, $I_E$ goes up and $\frac{I_E R_E}{V_E}$ goes up, then $V_{BE} = V_B - V_E$ goes down, so $I_C$ current is pulled down providing thermal stability.

b) $R_B = R_1 \parallel R_2 = 22.7 \, k\Omega$  

$V_{GB} = \frac{25}{2\pi} \times 12 = 1.1 \, V$  

$I_B = \frac{1.1 - 0.6}{R_B + (1+hFE)R_E} = \frac{0.5}{22.7 + 201k} = 2.2 \, \mu A$ \(/\)

$I_C = 0.44 \, mA$ \(/\)  

$I_E = 0.45 \, mA$ \(/\)  

$V_E = I_E \cdot R_E = 0.45 \times 12 = 5.4 \, V$ \(/\)  

$V_B = V_E + V_{BE} = 1.05 \, V$ \(/\)  

$V_C = V_{CC} - I_C \cdot R_E = 12 - 0.88 = 11.12 \, V$ \(/\)  

$V_{CE} = V_C - V_E = 10.67 \, V$ \(/\)  

$V_{BE} = 0.6 \, V$  

$k_v = \frac{V_{CE}}{V_{BE}} = \frac{10.67}{0.6} = 17.78$
b) \( R_e = \frac{V_i}{I_e} = \frac{25 \text{ mV}}{0.45 \text{ mA}} = 56 \Omega \)
\( h_{ie} = h_{fe} R_e \)
\( = 11.1 \text{ k}\Omega \)

\( R_i = h_{ie} = h_{fe} R_e = 11.1 \text{ k}\Omega \)

\( R_i = r_i \parallel R_B = 22.7 \text{ k}\Omega \parallel 11.1 \text{ k}\Omega = 7.5 \text{ k}\Omega \)

\( R_0 = R_C = 2 \text{ k}\Omega \)

\( V_i = h_{ie} I_B = h_{fe} R_e I_B \)

\( V_o = -h_{fe} I_B \left( \frac{R_C}{R_L} \right) \)

\( K_v = \frac{V_o}{V_i} \)

\( K_v = -\frac{h_{fe} I_B \left( \frac{R_C}{R_L} \right)}{h_{fe} R_e I_B} = -\frac{R_C}{R_L} \)

\( K_v = -\frac{2 \text{ k}}{2 \text{ k}} = -\frac{1000}{56} = -18 \)