\[ <100> \Rightarrow [100],[010],[001] \]
\[ [\bar{1}00],[0\bar{1}0],[00\bar{1}] \]
\[ <110> \Rightarrow [110],[101],[011] \]
\[ [\bar{1}\bar{1}0],[\bar{1}0\bar{1}],[0\bar{1}\bar{1}] \]
\[ [1\bar{1}0],[10\bar{1}],[01\bar{1}] \]
\[ [\bar{1}10],[\bar{1}01],[011] \]

**Figure 9-8** Various directions in a cubic system.
For cubic systems there is a set of simple relationships between a direction $[uvw]$ and a plane $(hkl)$ which are very useful.

1) $[uvw]$ is normal to $(hkl)$ when $u=h;v=k;w=l$. [111] is normal to (111).

2) $[uvw]$ is parallel to $(hkl)$, i.e., $[uvw]$ lies in $(hkl)$, when $hu + kv + lw = 0$ [112] is a direction in (111).

3) Two planes $(h_1k_1l_1)$ and $(h_2k_2l_2)$ are normal if $h_1h_2 + k_1k_2 + l_1l_2 = 0$. (100) is perpendicular to (001) and (010). (110) is perpendicular to (110).
4) Two directions \( u_1v_1w_1 \) and \( u_2v_2w_2 \) are normal if
\[
 u_1u_2 + v_1v_2 + w_1w_2 = 0.
\]
[100] is perpendicular to [001]. [111] is perpendicular to [112].

5) Angles between planes \((h_1k_1l_1)\) and \((h_2k_2l_2)\) are given by

\[
 \cos \theta = \frac{h_1h_2 + k_1k_2 + l_1l_2}{(h_1^2 + k_1^2 + l_1^2)^{1/2}(h_2^2 + k_2^2 + l_2^2)^{1/2}}
\]
Example: Write the indices of the marked planes
Example: Write the indices of the marked directions

Figure 9-10