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This is a 3-D problem involving position and displacement.

A particle has the following coordinates initially: $x = 1.0\,m$, $y = -3.0\,m$, $z = 8.0\,m$. Some time later the coordinates are: $x = 3.0\,m$, $y = -5.0\,m$, $z = 4.0\,m$. What is the displacement vector of the particle?

Solution:

$$\Delta\vec{r} = \vec{r}_2 - \vec{r}_1$$

$$\Delta\vec{r} = 3.0\hat{i} - 5.0\hat{j} + 4.0\hat{k} - (1.0\hat{i} - 3.0\hat{j} + 8.0\hat{k})$$

$$\Delta\vec{r} = 2.0\hat{i} - 2.0\hat{j} - 4.0\hat{k} \quad \text{(answer)}$$

(units in m)