23. We could proceed formally by setting up an xyz coordinate system and using Eq. 3-30 for the vector cross product, or we can approach this less formally in the style of Sample Problem 12-4 (which is our choice). For the 3.1 kg particle, Eq. 12-21 yields

$$\ell_1 = r_{\perp 1} m v_1 = (2.8)(3.1)(3.6) = 31.2 \text{ kg}\cdot\text{m}^2/\text{s} .$$

Using the right-hand rule for vector products, we find this $(\vec{r}_1 \times \vec{p}_1)$ is out of the page, perpendicular to the plane of Fig. 12-35. And for the 6.5 kg particle, we find

$$\ell_2 = r_{\perp 2} m v_2 = (1.5)(6.5)(2.2) = 21.4 \text{ kg}\cdot\text{m}^2/\text{s} .$$

And we use the right-hand rule again, finding that this $(\vec{r}_2 \times \vec{p}_2)$ is into the page. Consequently, the two angular momentum vectors are in opposite directions, so their vector sum is the *difference* of their magnitudes:

$$L = \ell_1 - \ell_2 = 9.8 \text{ kg}\cdot\text{m}^2/\text{s} .$$