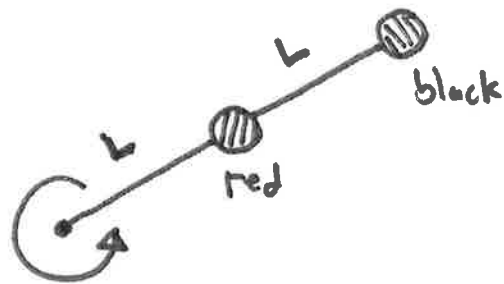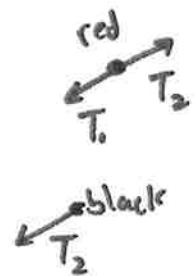EX 24.2   Whirling beads

For the   red bead, $m\dfrac{v_r^2}{L} = T_1 - T_2$

For the   black bead, $m\dfrac{v_b^2}{2L} = T_2$

The velocities of the beads are

$$v_{red} = \frac{2\pi L}{T}$$

$$v_{black} = \frac{4\pi L}{T}$$

So $m\dfrac{4\pi^2 L^2 / T^2}{\cancel{L}} = T_1 - T_2 \left.\right\}$ $T_1 = \dfrac{12 m \pi^2 L}{T^2}$

and $m\dfrac{16\pi^2 L^2 / T^2}{2\cancel{L}} = T_2 \left.\right\}$ $T_2 = \dfrac{8 m \pi^2 L}{T^2}$

therefor $\boxed{T_1 / T_2 = 3/2}$, and the inner string is

most likely to break