48. The initial angular momentum of the system is zero. The final angular momentum of the girl-plus-merry-go-round is $\left(I + MR^2\right)\omega$ which we will take to be positive. The final angular momentum we associate with the thrown rock is negative: $-mRv$, where v is the speed (positive, by definition) of the rock relative to the ground.

(a) Angular momentum conservation leads to

$$0 = \left(I + MR^2\right)\omega - mRv \quad \Longrightarrow \quad \omega = \frac{mRv}{I + MR^2} \ .$$

(b) The girl's linear speed is given by Eq. 11-18:

$$R\omega = \frac{mvR^2}{I + MR^2} \quad .$$