8-6)

$d = 0.52$ m → $R = 0.26$ m

$m = 50$ kg $\omega_i = 850$ rev/min(1min/60sec)(2π rad/rev) = 89 rad/sec. $\omega_f = 0$ (comes to rest)

$F_N = 160$ N $F_f = \mu_K N$ $\Delta t = 7.5$ sec

$\alpha = [\omega_f - \omega_i]/\Delta t = [0 - 89]/7.5 = -11.9$ rad/s^2

Let the axle be the pivot for the torque calculation. The torques due to the wheel's weight and the normal force that supports it are zero, since those forces act at the axis. The torque due to the normal force of the axe is zero, because the angle between r and FN is 180°. Only the frictional force exerts a torque about the axis.

$\tau_f = rF_f \sin\theta_{r,Ff} = I\alpha$

This is a disc, so $I = {}^1/_2 mR^2$

The frictional force is applied at the edge of the disc, tangent to the edge of the disc, and opposite to the direction of motion of the disc, so the torque is simply $-RF_f$. So,

$-RF_f = {}^1/_2 mR^2\alpha$

$-\mu_K N = {}^1/_2 mR\alpha$

$\mu_K = -mR\alpha/2N = -50*0.26*(-11.9)/2*160 =$ 0.48