

56. (a) The period of rotation is  $T = 2\pi/\omega$  and in this time all the charge passes any fixed point near the ring. The average current is  $i = q/T = q\omega/2\pi$  and the magnitude of the magnetic dipole moment is

$$\mu = iA = \frac{q\omega}{2\pi} \pi r^2 = \frac{1}{2} q\omega r^2 .$$

- (b) We curl the fingers of our right hand in the direction of rotation. Since the charge is positive, the thumb points in the direction of the dipole moment. It is the same as the direction of the angular momentum vector of the ring.