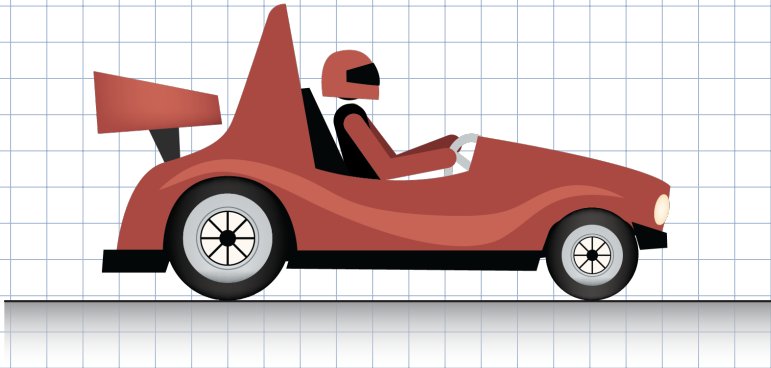
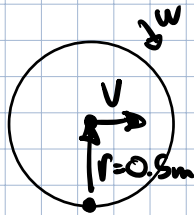


A race car is travelling along a straight road at a constant speed of 80 km/h. The engine provides a torque of $T = 50 \text{ Nm}$ at each of the back two wheels (radius $r = 0.5 \text{ m}$). Find the output power of the motor.

What is the efficiency of the motor if the input power is 17.78 kW?



$$P = T\omega$$



$$v = 80 \frac{\text{km}}{\text{h}}$$

$$\vec{v} = \vec{\omega} \times \vec{r}$$

$$\hookrightarrow \frac{v}{r} = \omega$$

$$P_{\text{out}} = T \frac{v}{r} = (50 \text{ Nm}) \frac{(80 \frac{\text{km}}{\text{h}})}{(0.5 \text{ m})} \left(\frac{1}{3.6} \frac{\text{km}}{\text{s}} \right) \times 2 = 4.44 \text{ kW}$$

$$P_{\text{out}} = 4.44 \text{ kW}$$

$$\eta = \frac{P_{\text{out}}}{P_{\text{in}}} = \frac{4.44 \text{ kW}}{17.78 \text{ kW}} = 0.25 = \eta$$