

37. We write the force as  $F = \alpha v$ , where  $v$  is the speed and  $\alpha$  is a constant of proportionality. The power required is  $P = Fv = \alpha v^2$ . Let  $P_1$  be the power required for speed  $v_1$  and  $P_2$  be the power required for speed  $v_2$ . Dividing  $P_2 = \alpha v_2^2$  by  $P_1 = \alpha v_1^2$ , we find

$$P_2 = \left( \frac{v_2}{v_1} \right)^2 P_1 .$$

Since  $P_1 = 7.5 \text{ kW}$  and  $v_2 = 3v_1$ ,

$$P_2 = (3)^2 (7.5 \text{ kW}) = 68 \text{ kW} .$$