$W = F_D d$ Energy of wind

1 gal of gas = 1.3×10^8 Joules

Effcency of a car engine = 25% - 50% (η)

$W_{air} = F_D d$

$W_{air} \cdot \frac{1 \text{ gal}}{1.3 \times 10^8 (\eta)} =$ gal of gas consumed

$F_D = \frac{1}{2} \rho v^2 C_D A \phi(d)$

$F_D(\infty) = \frac{1}{2} \rho v^2 C_D A \phi(\infty) = \frac{1}{2} \rho v^2 C_D A$

$F_D(0) = 0$

$\phi(d) = 0.7(1 - e^{-0.03d}) + 0.3$

$\rho = 1.184 \text{ kg/m}^3$ density of Air

$A = 2.5 \text{ m}^2$ cross-sechonal area of vehicle

$C_D = 0.32$ Drag coefficient

$\Rightarrow \frac{1}{2} \cdot \frac{\rho v^2 C_D A \phi(d)}{1.3 \times 10^8 \eta} =$ gal consumed

$$FC(v, d, \Delta d, \eta) = \frac{v^2 (1.184)(0.32)(2.5)\left[(0.7)(1 - e^{-0.03d}) + 0.3\right] \Delta d}{2 \cdot 1.3 \times 10^8 \eta}$$